This document provides pertinent information concerning the revocation and reissuance of the VPDES Permit listed below. This permit is being processed as a **Minor, Municipal** permit. The discharge results from the operation of a 0.10 MGD wastewater treatment plant with planned design flow increases to 0.311 MGD and 0.70 MGD. This permit action consists of updating the proposed effluent limits to reflect the current Virginia WQS, effective January 6, 2011, and updating permit language as applicable. It also recognizes the relocation of the discharge location from an impoundment of Camp Creek to the South Anna River. Finally, the permit authorizes reclamation and reuse of the treated effluent. The effluent limitations and special conditions contained in this permit will maintain the Water Quality Standards of 9VAC25-260 et seq. and the Water Reclamation and Reuse Regulations of 9VAC25-740-10 et seq.

1. Facility Name and Mailing Address:	Zion Crossroads WWTP P.O. Box 9 Louisa, VA 23093	SIC Code:	4952 WWTP
Facility Location:	323 Deer Run Lane Gordonsville, VA 22942	County:	Louisa
Facility Contact Name:	Wesley Basore, Wastewater Operations Manager	Telephone Number:	540-967-1122
2. Permit No.:	VA0090743	Expiration Date:	12/03/2013
Other VPDES Permits:	VAN030122 (Nutrient Trading General Permit)		
Other Permits:	None		
E2/E3/E4 Status:	NA		
3. Owner Name:	Louisa County Water Authority		
Owner Contact/Title:	Dean Rodgers -- General Manager, Louisa County Water Authority	Telephone Number:	540-967-1122
4. Application Complete Date:	7/3/2012		
Permit Drafted By:	Anna Westernik	Date Drafted:	7/06/2012; 8/29/2012
Draft Permit Reviewed By:	Alison Thompson	Date Reviewed:	7/09/2012; 8/30/2012 8/31/2012
WPM Review By:	Bryant Thomas	Date Reviewed:	10/3/2012
Public Comment Period :	Start Date: 11/16/2012	End Date:	12/17/2012
5. Receiving Waters Information:	See **Attachment 1** for the Flow Frequency Determination at the South Anna River Outfall.		

Current Receiving Stream Name:	**Outfall 001 Impoundment of Camp Creek**	Stream Code:	8-CMP
Drainage Area at Outfall:	3.69 square miles	River Mile:	3.2
Stream Basin:	York River	Subbasin:	None
Section:	3	Stream Class:	III
Special Standards:	None	Waterbody ID:	VAN-F01R
7Q10 Low Flow:	Not Determinable	7Q10 High Flow:	Not Determinable
1Q10 Low Flow:	Not Determinable	1Q10 High Flow:	Not Determinable
30Q10 Low Flow:	Not Determinable	30Q10 High Flow:	Not Determinable
Harmonic Mean Flow:	Not Determinable	30Q5 Flow:	Not Determinable
303(d) Listed:	Yes (Downstream Impairment for Bacteria and Benthic Impairments)		
TMDL Approved:	Yes (Pamunkey River Bacteria)	Date TMDL Approved:	8/2/2006

Proposed Receiving Stream Name:	**Outfall 002 South Anna River**	Stream Code:	8-SAR
Drainage Area at Outfall:	92.3 square miles	River Mile:	86.4
Stream Basin:	York River	Subbasin:	None
Section:	3	Stream Class:	III
Special Standards:	None	Waterbody ID:	VAN-F02R
7Q10 Low Flow:	0.13 MGD	7Q10 High Flow:	4.62 MGD
1Q10 Low Flow:	0.09 MGD	1Q10 High Flow:	3.31 MGD
30Q10 Low Flow:	0.20 MGD	30Q10 High Flow:	9.25 MGD
Harmonic Mean Flow:	Undefined	30Q5 Flow:	0.49 MGD
303(d) Listed:	Yes (Bacteria)		
TMDL Approved:	Yes (Pamunkey River Bacteria)	Date TMDL Approved:	8/2/2006

Proposed Receiving Stream Name:	**Outfall 003 South Anna River**	Stream Code:	8-SAR
Drainage Area at Outfall:	92.8 square miles	River Mile:	85.8
Stream Basin:	York River	Subbasin:	None
Section:	3	Stream Class:	III
Special Standards:	None	Waterbody ID:	VAN-F02R
7Q10 Low Flow:	0.13 MGD	7Q10 High Flow:	4.62 MGD
1Q10 Low Flow:	0.09 MGD	1Q10 High Flow:	3.31 MGD
30Q10 Low Flow:	0.20 MGD	30Q10 High Flow:	9.25 MGD
Harmonic Mean Flow:	Undefined	30Q5 Flow:	0.49 MGD
303(d) Listed:	Yes (Bacteria)		
TMDL Approved:	Yes (Pamunkey River Bacteria)	Date TMDL Approved:	8/2/2006

Proposed Receiving Stream Name:	**Outfall 004 South Anna River**	Stream Code:	8-SAR
Drainage Area at Outfall:	113.5 square miles	River Mile:	80.44
Stream Basin:	York River	Subbasin:	None
Section:	3	Stream Class:	III
Special Standards:	None	Waterbody ID:	VAN-F02R
7Q10 Low Flow:	0.16 MGD	7Q10 High Flow:	5.69 MGD
1Q10 Low Flow:	0.11 MGD	1Q10 High Flow:	4.08 MGD
30Q10 Low Flow:	0.25 MGD	30Q10 High Flow:	11.37 MGD
Harmonic Mean Flow:	Undefined	30Q5 Flow:	0.60 MGD
303(d) Listed:	Yes (Bacteria)		
TMDL Approved:	Yes (Pamunkey River Bacteria)	Date TMDL Approved:	8/2/2006

6. Statutory or Regulatory Basis for Special Conditions and Effluent Limitations:

✓	State Water Control Law	✓	EPA Guidelines
✓	Clean Water Act	✓	Water Quality Standards
✓	VPDES Permit Regulation		Other: (PES, Occoquan Policy, Dulles)
✓	EPA NPDES Regulation		

7. **Licensed Operator Requirements:** Class II at 0.1 MGD and 0.311 MGD Design Flow Tiers
Class I at 0.7 MGD Design Flow Tier

8. **Reliability Class:** Class I

9. **Permit Characterization:**

	Private	✓	Effluent Limited		Possible Interstate Effect
	Federal	✓	Water Quality Limited	✓	Compliance Schedule Required
	State	✓	Toxics Monitoring Program Required	✓	Interim Limits in Permit
✓	POTW	✓	Pretreatment Program Required		Interim Limits in Other Document
✓	TMDL				

10. **Wastewater Sources and Treatment Description:**

The Zion Crossroads STP currently serves 350 single-family homes in the Spring Creek Subdivision and 44 commercial connections. The estimated residential population is 1,000. Effluent from the Zion Crossroads WWTP is presently discharged to an impoundment of Camp Creek. From there it flows to Camp Creek, Wheeler Creek, Hudson Creek, and subsequently the South Anna River. Downstream from the impoundment, Camp Creek flows through the Green Springs National Historic Landmark District. Virginia Water Protection (VWP) individual permit No. 02-0753 was issued on July 1, 2003, to authorize the surface water impacts associated with the construction of the Spring Creek multi-use golf community and water withdrawal from the impoundment of Spring Branch and a supplemental withdrawal from the impoundment of Camp Creek.

This permit revocation and reissuance authorizes relocation of the effluent discharge directly to the South Anna River at one of three potential locations. This would be accomplished by construction of discharge pipe that parallels Routes 15 and 250. In addition to relocating the discharge, the Louisa County Water Authority intends to provide reclaimed water for reuse. Businesses located along the pipeline will have the option of tapping into the pipeline and using it as a reclaimed water source. It is anticipated that that construction of the pipeline will be completed in approximately four years (November 2016).

0.10 MGD Plant

Influent from the Spring Creek Subdivision flows via gravity where it is pumped with the influent from the commercial connections. Sewage from the pump station travels through a primary treatment unit consisting of two barscreens (one automatic and one manual that is used as a bypass). After screening, wastewater flows to one of the two sequencing batch reactor (SBR) units. A flow splitter is present to divert flow to either SBR. However, only one is used at this time. Within the SBR unit, wastewater is mixed with sludge and aerated, settled, and decanted for a given cycle of time. Effluent leaving the SBR unit flows to an equalization tank where it is reaerated. All effluent leaving the equalization tank travels through a cloth disk filter unit, a Parshall Flume where it is metered, and is then disinfected with ultraviolet radiation (UV) before being discharged to an impoundment of Camp Creek.

0.311 MGD Plant

The planned design for the Zion Crossroads WWTP at the 0.311 MGD flow tier will involve converting the existing SBR basins into aerobic digesters and installing an oxidation ditch/carrousel and secondary clarifiers for biological treatment. Construction should be completed by April 30, 2013.

Influent will be pumped from the Spring Creek Subdivision and the commercial connections to a preliminary treatment unit consisting of manual and mechanical bar screens, a grit chamber, and an offline equalization basin. Influent flow will be measured at the influent pump station. Secondary treatment will consist of an oxidation ditch and two secondary clarifiers. Waste activated sludge will be sent to an aerobic digester that was originally the sequencing batch reactor for the 0.10-MGD plant. Tertiary filtration, UV disinfection, and diffused post aeration will be provided before the effluent is discharged. Effluent is to be metered before the UV and post aeration basins.

Since treatment is being changed from a SBR to an oxidation ditch, the following treatment processes will be needed: upgraded influent pump station, a grit chamber, an oxidation ditch, secondary clarifiers, chemical feed facilities, a return activated sludge pumping station, a sludge dewatering building, tertiary filtration, additional UV banks, and diffused post aeration.

The 0.311 MGD plant will be designed to allow for a simple expansion to the 0.7 MGD flow tier with minimal upgrades.

0.70 MGD Plant
Tertiary rapid mix, flocculation basin, and extra UV banks may need to be incorporated into the 0.7 MGD facility to treat the additional flow and meet state of the art nutrient limits:

See **Attachment 2** for a facility schematic/diagram at each design flow tier.
See **Attachment 3** for an aerial photograph of the impoundment.

TABLE 1 – OUTFALL DESCRIPTION

Outfall Number	Discharge Sources	Treatment	Design Flow	Latitude/Longitude
001 – Camp Creek Impoundment	Domestic and/or Commercial Wastewater	See Item 10 above.	0.10 MGD 0.311 MGD 0.7 MGD	38° 00' 05.1" N 78° 11' 49.8" W
002 – South Anna River	Domestic and/or Commercial Wastewater	See Item 10 above.	0.311 MGD 0.7 MGD	37° 59' 34.7" N 78° 07' 7.8" W
003 – South Anna River	Domestic and/or Commercial Wastewater	See Item 10 above.	0.311 MGD 0.7 MGD	37° 59' 19.5" N 78° 06' 42.1" W
004 – South Anna River	Domestic and/or Commercial Wastewater	See Item 10 above.	0.311 MGD 0.7 MGD	37° 58' 50.9" N 78° 02' 55.1" W
See **Attachment 4** (Boswells Tavern and Ferncliff Topographic Maps; 172C and 152A).				

11. **Sludge Treatment and Disposal Methods:**
Wasted sludge is sent to an aerobic digester on site for stabilization. The stabilized sludge is transported to the Louisa County Regional WWTP for further treatment and dewatering. Disposal is in accordance with the sludge management plan for the Louisa County Regional WWTP (VA0067954). Once the dewatering building of the upgraded plant is designated as substantially complete and a CTO is issued for the 0.311 MGD facility, the Zion Crossroads WWTP will commence using a centrifuge to dewater the sludge at the Zion Crossroads WWTP.

12. Discharges, Intakes, Monitoring Stations and Other Items in Vicinity of Discharges or Within Waterbodies:

TABLE 2
DISCHARGES AND MONITORING STATIONS WITHIN WATERBODIES VAN-F01R and VAN-F02R

Individual VPDES Permits Discharging to Waterbody VAN-F01R			
Description	**Type**	**Latitude/ Longitude**	**Rivermile**
VA0021105 -- Gordonsville STP	0.94 MGD Municipal Wastewater Discharge	37° 07' 30"; 78° 11' 59"	0.23 South Anna River, UT
VA0088706 -- South Creek, Zion Crossroads STP	0.0395 MGD Municipal Wastewater Discharge	37° 58' 22" 78° 12' 40	3.1 Central Branch, U.T.
VA0091332 – Outfall 001, Old Dominion Electric Cooperative Louisa)	0.05 MGD Industrial Wastewater Discharge	38° 06' 56" 78° 13' 02"	Unnamed tributary Happy Creek
VA0091332 – Outfall 002, Old Dominion Electric Cooperative (Louisa)	0.05 MGD Industrial Wastewater Discharge	38° 07' 01"; 78° 12' 49"	Unnamed tributary Happy Creek
VA0092533 -- Klockner Pentaplast of America	0.0058 MGD Industrial Wastewater Discharge	38° 07' 02"; 78° 12' 04"	0.26 South Anna River, UT
VA0087033 – Dominion (Gordonsville Power Station)	0.056 MGD Industrial Wastewater Discharge	38° 07' 24" 78° 12' 19"	100.53 South Anna River
VA0076678 -- Shenandoah Crossing STP	0.1 MGD Municipal Wastewater Discharge	38° 04' 32" 78° 08' 57"	0.54 Lickinghole Creek
VA0090743 Zion Crossroads WWTP (001)	0.7 MGD Municipal Wastewater Discharge	38° 00' 5.1" 77° 11' 49.8"	3.17 Camp Creek Impoundment
Individual VPDES Permits Discharging to Waterbody VAN-F02R			
Description	**Type**	**Latitude/ Longitude**	**Rivermile**
VA0088421 -- Twin Oaks Community STP	0.01 MGD Municipal Wastewater Discharge	37° 55' 56"; 77° 59' 39"	0.3 Polecat Creek
VA0067954 – Louisa Regional WWTP	0.4 MGD Municipal Wastewater Discharge with Proposed Upgrade to 0.8 MGD	38° 00' 30" 77° 59' 38"	5.88 Beaver Creek
VA0058891 -- Northeast Creek WTP	0.05 MGD Industrial Wastewater Discharge	37° 58' 36" 77° 56' 27"	3.83 Northeast Creek
VA0090743 Zion Crossroads WWTP (002)	0.7 MGD Municipal Wastewater Discharge	37° 59' 4.7" 78° 07' 7.8"	86.4 South Anna River
VA0090743 Zion Crossroads WWTP (003)	0.7 MGD Municipal Wastewater Discharge	37° 59' 19.5" 78° 06' 42.1"	85.8 South Anna River
VA0090743 Zion Crossroads WWTP (004)	0.7 MGD Municipal Wastewater Discharge	37° 58' 50.9" 78° 02' 55.1"	80.4 South Anna River

General Permits Discharging to Waterbody VAN-F01R		
Single Family Homes		
Permit Number	**Facility Name**	**Receiving Stream**
VAG406455	Seymour George Property	South Anna River, UT
VAG406484	Haney Heather and Carol Residence	Bowles Creek, UT
VAG406474	East End Farm	Hudson Creek, UT
VAG406049	Annandale Land Trust Residence	South Anna River, UT
VAG406496	Nolting Elisabeth Aiken Residence	Fielding Creek, UT

Storm Water Industrial		
Permit Number	**Facility Name**	**Receiving Stream**
VAR051812	Schneider National Carriers 064	UT, to Central Branch Creek
VAR050969	Trus Joist - Gordonsville Logyard	South Anna River, UT
VAR050848	Klockner Pentaplast of America Inc - Gordonsville	UT, South Anna River

General Permits Discharging to Waterbody VAN-F02R		
Single Family Homes		
Permit Number	**Facility Name**	**Receiving Stream**
VAG406501	Jordan Samuel and Leslie Residence	Desper Creek
VAG406370	William A Cooke Inc - Residence	Beaver Creek, UT
VAG406402	Dove - Residence	Fosters Creek, UT
VAG406492	Keenan Michael Residence	Reedy Creek
VAG406457	Crickenberger Stephanie Residence	Harris Creek, UT
Storm Water Industrial		
Permit Number	**Facility Name**	**Receiving Stream**
VAR051660	Louisa County Airport (Freeman Field)	Beaver Creek & Northeast Creek
VAR051745	Colonial Pipeline - Louisa	Harris Creek, UT
VAR052063	C3RS Incorporated	UT to Beaver and Northeast Creek
VAR052027	Southern Auto Parts	UT to Roundabout Creek
VAR051660	Louisa County Airport (Freeman Field)	Beaver Creek and Northeast Creek
DEQ Monitoring Stations in Waterbody VAN-F01R		
Station ID	**Type of Station**	**Receiving Stream**
8-CMP000.28	Special Study Station/Biological Station	Camp Creek
8-HUD001.80	Watershed Station	Hudson Creek
8-SAR097.82	TMDL, Special Study, Watershed Station/Biological Station	South Anna River
8-SAR101.03	Special Study Station	South Anna River
8-WLR000.26	Special Study Station/Biological Station	Wheeler Creek
8-WLR000.31	Special Study Station/Biological Station	Wheeler Creek
DEQ Monitoring Stations in Waterbody VAN-F02R		
Station ID	**Type of Station**	**Receiving Stream**
8-FOS000.84	Watershed Station	Foster's Creek
8-NTH001.02	Watershed Station	Northeast Creek
8-RDB001.72	Watershed Station	Roundabout Creek
8-SAR089.35	At the head of Waterbody VAN-F02R. Serves as a trend station for Waterbody VAN-F01R.	South Anna River

13. Material Storage:

TABLE 3 MATERIAL STORAGE		
Materials Description	**Volume Stored**	**Spill/Stormwater Prevention Measures**
Soda Ash	Maximum of 162 50-lb. bags	Stored in the garage section of the laboratory building that contains a drain to the head of the plant.
Sodium Hypochlorite	Maximum of 6 55-gallon drums	Stored in the containment area of the Tertiary Filter Building that contains a drain to the head of the plant with an isolation valve.
MicroCGlycerin	Maximum of 5,050 gallons in a bulk storage tank	Stored in the Carbon Source Storage Tank located in the containment area next to the new Tertiary Filter Building that contains a drain to the head of the plant with an isolation valve.
Alum	Maximum of 7,300 gallons in a bulk storage tank	Stored in the Alum Bulk Storage Tank in the containment area next to the new Tertiary Filter Building that contains a drain to the head of the plant with an isolation valve.

14. Site Inspection: Performed by Anna Westernik and Bryant Thomas on August 9, 2012 (see **Attachment 5**).

15. Receiving Stream Water Quality and Water Quality Standards:

a. Ambient Water Quality Data

The current receiving stream is an impoundment of Camp Creek. There is no monitoring information available for the portion of Camp Creek that receives the discharge from VA0090743; however, there is monitoring data available on a further downstream segment of Camp Creek. The nearest downstream DEQ monitoring station on Camp Creek is Station 8-CMP000.28, located at the Route 717 bridge crossing. This station is located approximately 3.0 rivermiles downstream from Outfall 001.

This permit revocation and reissuance proposes relocating the outfall to discharge into one of three proposed locations of the South Anna River that is monitored and assessed. Table 4 below presents a stream impairment summary and TMDL information regarding the discharge locations.

TABLE 4 Impairment Information in the Draft 2012 Integrated Report							
Waterbody Name	**Impaired Use**	**Cause**	**Distance From Outfall**	**TMDL completed**	**WLA**	**Basis for WLA**	**TMDL Schedule**
Camp Creek	Recreation	*E. coli*	1.26 miles	Pamunkey River Bacteria 8/2/2006	1.22E+12 cfu/year *E. coli*	126 cfu/100ml 0.7 MGD	N/A
	Aquatic Life	Benthic Macroinvertebrates	1.26 miles	No	N/A	N/A	2024
South Anna River	Recreation	*E. coli*	0.0 miles (002/ 003) 4.3 miles (004)	Pamunkey River Bacteria 8/2/2006	1.22E+12 cfu/year *E. coli*	126 cfu/100ml 0.7 MGD	N/A

Significant portions of the Chesapeake Bay and its tributaries are listed as impaired on Virginia's 303(d) list of impaired waters for not meeting the aquatic life use support goal, and the 2010 Virginia Water Quality Assessment 305(b)/303(d) Integrated Report indicates that much of the mainstem Bay does not fully support this use support goal under Virginia's Water Quality Assessment Guidelines. Nutrient enrichment is cited as one of the primary causes of impairment. EPA issued the Bay TMDL on December 29, 2010. It was based, in part, on the Watershed Implementation Plans developed by the Bay watershed states and the District of Columbia.

The Chesapeake Bay TMDL addresses all segments of the Bay and its tidal tributaries that are on the impaired waters list. As with all TMDLs, a maximum aggregate watershed pollutant loading necessary to achieve the Chesapeake Bay's water quality standards has been identified. This aggregate watershed loading is divided among the Bay states and their major tributary basins, as well as by major source categories (wastewater, urban storm water, onsite/septic agriculture, air deposition). Section 17.e of this fact sheet provides additional information on specific nutrient limitations for this facility to implement the provisions of the Chesapeake Bay TMDL.

The full planning statement is found in **Attachment 6**.

b. Receiving Stream Water Quality Criteria

Part IX of 9VAC25-260(360-550) designates classes and special standards applicable to defined Virginia river basins and sections. The receiving streams, an impoundment of Camp Creek and the South Anna River, are located within Section 3 of the York River Basin and are designated as Class III waters.

Class III waters must achieve a dissolved oxygen (D.O.) of 4.0 mg/L or greater, a daily average D.O. of 5.0 mg/L or greater, and a temperature that does not exceed 32° C at all times. Additionally, they must maintain a pH of 6.0-9.0 standard units (S.U.).

1) Ammonia at Camp Creek Outfall:

The fresh water, aquatic life water quality criteria for ammonia is dependent on the instream temperature and pH. The 90th percentile temperature and pH values are used because they best represent the critical design conditions of the receiving stream.

The 30Q10 and 1Q10 of the Camp Creek Impoundment are assumed to be 0.0 MGD. The Virginia Water Quality Standards at 9VAC25-260-20B.4 state that mixing zones are not allowed for lakes and ponds. Therefore, effluent data is being used to establish the ammonia water quality criteria.

See **Attachment 7** for the derivation of the 90th percentile values of the effluent pH and temperature data for the period of January 2011 through March 2012. The calculated 90th percentile effluent pH and temperature values for this period are 8.0 S.U. and 23° C. These values differ significantly from the instream pH and temperature values of 5.8 S.U. and 26°C used to calculate ammonia criteria during the previous permit reissuance. The ammonia water quality standards calculations are shown in **Attachment 8**.

2) Ammonia at the South Anna River Outfalls

Staff has evaluated the October 2002 through March 2012 receiving stream ambient monitoring data derived from DEQ Monitoring Station 8-SAR089.35, located approximately 2.4 miles upstream from the proposed Outfall 002, for pH and temperature and finds the 90th percentile pH value to be 7.4 S.U. and the 90th percentile annual temperature value to be 24.5° C (see **Attachment 7**). A default value of 15° C for the wet season temperature was used to calculate ammonia criteria.

Effluent pH and temperature data was also used to calculate ammonia criteria. The derived 90th percentile values of the effluent pH and temperature data for the period of January 2011 through March 2012 are 8.0 S.U. and 23° C. A default value of 15° C for wet season temperature was used to calculate ammonia criteria.

The calculated ammonia criteria and wasteload allocations are found in **Attachment 8**.

3) Metals Criteria at the Camp Creek Outfall:

Metals water quality criteria can be dependent on either the receiving stream's hardness, the effluent hardness, or a mixture of both. The hardness value used to express metals water quality criteria is expressed as mg/L calcium carbonate. Since the 7Q10 flow value of the Camp Creek Impoundment is zero, effluent hardness data is used to determine the metals criteria. The hardness-dependent metals water quality criteria in **Attachment 8** are based on an average effluent hardness value of 201 mg/L from quarterly sampling conducted from the first quarter of 2009 through the first quarter of 2012 (see **Attachment 9**).

4) Metals Criteria at the South Anna River Outfalls:
Flow values for the proposed discharge locations to the South Anna River (Outfalls 002, 003, and 004) are described in **Attachment 1**. A mixture of effluent and stream hardness data is used to determine the metals criteria for both the 0.311 MGD and 0.7 MGD design flow tiers. The hardness-dependent metals water quality criteria in **Attachment 8** are based on an average effluent hardness value of 201 mg/L from quarterly effluent sampling conducted from the first quarter of 2009 through the first quarter of 2012 and the mean hardness of 35 mg/L in the South Anna River is derived from data collected from Monitoring Station 8-SAR089.35 from October 2002 through May 2003 (see **Attachment 9**).

5) Bacteria Criteria:
The Virginia Water Quality Standards 9VAC25-260-170.A state that the following criteria shall apply to protect primary recreational uses in surface waters:

E. coli per 100 mL of water shall not exceed a monthly geometric mean of the following:

	Geometric Mean[1]
Freshwater *E. coli* (N/100 mL)	126

[1]For a minimum of four weekly samples taken during any calendar month

Attachment 8 details other water quality criteria applicable to the receiving stream.

c. Receiving Stream Special Standards
The State Water Control Board's Water Quality Standards, River Basin Section Tables (9VAC25-260-360, 370 and 380) designates the river basins, sections, classes and special standards for surface waters of the Commonwealth of Virginia. Both receiving streams, an impoundment of Camp Creek and the South Anna River, are located within Section 3 of the York River Basin. This section has not been designated with a special standard.

d. Threatened or Endangered Species
The Virginia DGIF Fish and Wildlife Information System Database was searched on April 26, 2012 and August 23, 2012 for records to determine if there are threatened or endangered species in the vicinity of the discharge. The following threatened or endangered species were identified within a two-mile radius of the discharge to the Camp Creek Impoundment: Upland Sandpiper, Loggerhead Shrike, Appalachian Grizzled Skipper, Bald Eagle, Green Floater, Atlantic Pigtoe, and Migrant Loggerhead Shrike. The following threatened or endangered species were identified within a two-mile radius of the discharge locations to the South Anna River: Upland Sandpiper, Loggerhead Shrike, Appalachian Grizzled Skipper, Green Floater, Bald Eagle, and Migrant Loggerhead Shrike. The limits proposed in this draft permit are protective of the Virginia Water Quality Standards and protect the threatened and endangered species found near the discharge.

16. Antidegradation (9VAC25-260-30):

All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by the Virginia Water Quality Standards. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

a. The discharge to the Camp Creek Impoundment was classified as Tier 2 when this permit was first issued in 2001 since there was no water quality data available to make a tier determination. The Tier 2 classification will remain. No significant degradation to the existing water quality will be allowed. In accordance with current DEQ guidance, no significant lowering of water quality is to occur where permit limits are based on the following: The dissolved oxygen in the receiving stream is not lowered more than 0.2 mg/L from the existing levels;

2) The pH of the receiving stream is maintained within the range 6.0 – 9.0 S.U.;

3) There is compliance with all temperature criteria applicable to the receiving stream;

4) No more than 25% of the unused assimilative capacity is allocated for toxic criteria established for the protection of aquatic life; and

5) No more than 10% of the unused assimilative capacity is allocated for criteria for the protection of human health.

The antidegradation policy also prohibits the expansion of mixing zones to Tier 2 waters unless the requirements of 9VAC25-260-30.A.2 are met. The draft permit is not proposing an expansion of the existing mixing zone.

b. The discharge area to the South Anna River has been classified as Tier 1 as there is an aquatic life use impairment for the South Anna River upstream from the discharge area in waterbody F01. The aquatic life use impairment is due to DEQ biological monitoring indicating a poor benthic community. DEQ biological monitoring conducted in spring 2012 on the South Anna River downstream from the discharge area confirms that the benthic community does not support the aquatic life use. Additionally, ambient monitoring data has shown elevated levels of pH and total phosphorus (TP) in monitoring conducted on the South Anna River upstream from the discharge in waterbody F01. A pH impairment was first listed in 2004 for monitoring conducted at station 8-SAR097.82, located at the Route 603 bridge crossing in waterbody F01, due to pH excursions above the criteria range of 6.0-9.0 standard units. This impairment was delisted in 2006. Furthermore, while there are no nutrient criteria against which to assess the TP data, the TP values were noted with an observed effect in the 2006 Integrated Assessment. This historical evidence of nutrient enrichment is supported with the DEQ 2012 biological monitoring at rivermile 76.10 on the South Anna River (at the Rt. 604 bridge crossing); the taxa present were dominated by hydropsychidae which is indicative of nutrient enrichment. It is staff's best professional judgment that this portion of the South Anna River is Tier 1 with the noted water quality impairment, biological monitoring downstream from the discharge area and nutrient observations.

Permit limits proposed have been established by determining wasteload allocations that will result in attaining and/or maintaining all water quality criteria applicable to the receiving stream, including narrative criteria. These wasteload allocations will provide for the protection and maintenance of all existing uses.

17. Effluent Screening, Wasteload Allocation, and Effluent Limitation Development:

To determine water quality-based effluent limitations for a discharge, the suitability of data must first be determined. Data is suitable for analysis if one or more representative data points are equal to or above the quantification level ("QL") and the data represent the exact pollutant being evaluated.

Next, the appropriate Water Quality Standards (WQS) are determined for the pollutants in the effluent. Then, the Wasteload Allocations (WLAs) are calculated. Since the critical flows 7Q10 and 1Q10 the Camp Creek Impoundment have been determined to be zero, the WLAs are equal to the WQS at this outfall location. The WLA values are then compared with available effluent data to determine the need for effluent limitations. Effluent limitations are needed if the 97th percentile of the daily effluent concentration values is greater than the acute wasteload allocation or if the 97th percentile of the four-day average effluent concentration values is greater than the chronic wasteload allocation. In the case of ammonia evaluations, limits are needed if the 97th percentile of the thirty-day average effluent concentration values is greater than the chronic WLA. Effluent limitations are then calculated based upon the most limiting WLA, the required sampling frequency and statistical characteristics of the effluent data.

a. <u>Effluent Screening</u>
Effluent data obtained from the permit application and the Discharge Monitoring Reports (DMRs) has been reviewed and determined to be suitable for evaluation. Based upon this review and expected discharge from treatment plant operations, wasteload allocation analyses are required for ammonia, total residual chlorine, total recoverable copper, and total recoverable zinc.

Staff derived wasteload allocations where parameters are reasonably expected to be present in an effluent (e.g., total residual chlorine where chlorine is used as a means of disinfection) and where effluent data indicate the pollutant is present in the discharge above quantifiable levels. With regard to the discharge from the Zion Crossroads WWTP, ammonia as N is likely present since this is a wastewater treatment plant, total residual chlorine may be present when the facility discharges to the South Anna River since chlorine will be used for disinfection within the pipeline, and monitoring data from the DMRs indicate that total recoverable copper and total recoverable zinc are present above quantifiable levels in the discharge. As such, **Attachment 8** details the mixing analysis results and WLA derivations for these pollutants.

b. Mixing Zones and Wasteload Allocations (WLAs)

Wasteload allocations (WLAs) are calculated for those parameters in the effluent with the reasonable potential to cause an exceedance of water quality criteria. The basic calculation for establishing a WLA is the steady state complete mix equation:

$$WLA = \frac{C_o[Q_e + (f)(Q_s)] - [(C_s)(f)(Q_s)]}{Q_e}$$

Where:
- WLA = Wasteload allocation
- C_o = In-stream water quality criteria
- Q_e = Design flow
- Q_s = Critical receiving stream flow (1Q10 for acute aquatic life criteria; 7Q10 for chronic aquatic life criteria; harmonic mean for carcinogen-human health criteria; 30Q10 for ammonia criteria; and 30Q5 for non-carcinogen human health criteria)
- f = Decimal fraction of critical flow
- C_s = Mean background concentration of parameter in the receiving stream.

The Water Quality Standards contain two distinct mixing zone requirements. The first requirement is general in nature and requires the "use of mixing zone concepts in evaluating permit limits for acute and chronic standards in 9VAC25-260-140.B". The second requirement is specific and establishes special restrictions for regulatory mixing zones "established by the Board".

Camp Creek is considered to have a 7Q10 and 1Q10 of 0.0 MGD because the Virginia Water Quality Standards at 9VAC25-260-20B.4 state that mixing zones are not allowed for lakes and ponds. Therefore, the WLA is equal to the C_o. However, there is measurable flow in the South Anna River during periods of drought. Therefore, a simplified mixing model used by the Department of Environmental Quality will be used to estimate the amount of mixing of the discharge with the receiving stream within specified acute and chronic exposure periods at the proposed South Anna River discharge points. The simplified model contains the following assumptions and approximations:

- The effluent enters the stream from the bank, either via a pipe, channel or ditch.
- The effluent velocity isn't significantly greater (no more than 1 - 2 ft/sec greater) than the stream velocity.
- The receiving stream is much wider than its depth (width at least ten times the depth).
- Diffusive mixing in the longitudinal direction (lengthwise) is insignificant compared with advective transport (flow).
- Complete vertical mixing occurs instantaneously at the discharge point. This is assumed since the stream depth is much smaller than the stream width.
- Lateral mixing (across the width) is a linear function of distance downstream.
- The effluent is neutrally buoyant (e.g. the effluent discharge temperature and salinity are not significantly different from the stream's ambient temperature and salinity).
- Complete mix is determined as the point downstream where the variation in concentration is 20% or less across the width and depth of the stream.
- The velocity of passing and drifting organisms is assumed equal to the stream velocity.

If it is suitably demonstrated that a reasonable potential for lethality or chronic impacts within the physical mixing area doesn't exist, then the basic complete mix equation, with 100% of the applicable stream flow, is appropriate. If the mixing analysis determines there is a potential for lethality or chronic impacts within the physical mixing area, then the proportion of stream flow that has mixed with the effluent over the allowed exposure time is used in the basic complete mix equation. As such, the wasteload allocation equation is modified to account for the decimal fraction of critical flow (f).

Antidegradation Wasteload Allocations (AWLAs)
Since the Camp Creek impoundment has been determined to be a Tier 2 water, staff must also determine antidegradation wasteload allocations (AWLAs). The steady state complete mix equation is used substituting the antidegradation baseline (C_b) for the in-stream water quality criteria (C_o):

$$AWLA = \frac{C_b(Q_e + Q_s) - (C_s)(Q_s)}{Q_e}$$

Where:
- AWLA = Antidegradation-based wasteload allocation
- C_b = In-stream antidegradation baseline concentration
- Q_e = Design flow
- Q_s = Critical receiving stream flow (1Q10 for acute aquatic life criteria; 7Q10 for chronic aquatic life criteria; harmonic mean for carcinogen-human health criteria; 30Q10 for ammonia criteria; and 30Q5 for non-carcinogen human health criteria)
- C_s = Mean background concentration of parameter in the receiving stream.

Calculated (A)WLAs for the pollutants noted in 17.b. above are presented in **Attachment 8**.

c. Effluent Limitations – Toxic Pollutants
9VAC25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Those parameters with (A)WLAs that are near effluent concentrations are evaluated for limits.

DEQ utilizes a statistical program to determine the monthly average and weekly average effluent limits for toxic parameters such as metals. The statistics take into account the frequency of monitoring along with the calculated wasteload allocations and effluent concentrations to determine whether reasonable potential exists for the effluent concentration to exceed the calculated WLAs. From this evaluation, the program establishes limitations that will protect the receiving stream. This statistical package has been in use for many years and staff believes that it is appropriate for effluent limit derivation in this permit as well.

The VPDES Permit Regulation at 9VAC25-31-230.D. requires that monthly and weekly average limitations be imposed for continuous discharges from POTWs and monthly average and daily maximum limitations be imposed for all other continuous non-POTW discharges.

1) Ammonia as N/TKN:
In the last permit reissuance, DEQ used a monthly average TKN limitation of 3.0 mg/L to control both ammonia and DO levels. It is generally accepted that TKN consists of approximately 60% ammonia in raw wastewater. As the waste stream is treated, the ammonia component of TKN is converted to Nitrate (NO_3) and Nitrite (NO_2). It is estimated that a facility achieving a TKN limit of 3.0 mg/L essentially removes ammonia from the waste stream, resulting in a 'self-sustaining' quality effluent that protects against ammonia toxicity.

The toxicity of ammonia is dependent on the pH of the effluent and/or receiving stream. Ammonia can exist as both "ionized ammonia" (NH_4) and "un-ionized ammonia" (NH_3) forms. Research has shown that the un-ionized ammonia is the fraction that is toxic to aquatic life, while the ionized ammonia has been found to have little or no toxic effect. Furthermore, it has been demonstrated that the un-ionized fraction increases correspondingly with rising pH values; thus, increasing potential toxicity.

Staff has recalculated (A)WLAs for ammonia using newly-calculated criteria and the current critical flows (see Section 15.b of this fact sheet). In accordance with current DEQ guidance, staff used a default data point of 9.0 mg/L and the calculated (A)WLAs to derive limits. (See **Attachment 10**). Table 5 below summarizes the calculated average monthly and weekly limits for the design flow tiers and discharge points. Since it is estimated that a TKN limit of 3.0 mg/L will effectively remove ammonia, the current TKN limit of 3.0 mg/L is deemed to be protective of the receiving stream and shall remain in this permit at the Camp Creek Impoundment discharge location. It shall also be used at the South Anna River discharge locations. As in the previous reissuance, the weekly average TKN limit will be 4.5 mg/L based on a multiplier of 1.5 times the monthly average.

TABLE 5
CALCULATED AMMONIA AS NITROGEN LIMITS

Design Flow (MGD)	Calculated Average Monthly Limit in mg/L (Camp Creek Impoundment) Outfall 001	Calculated Average Weekly Limit in mg/L (Camp Creek Impoundment) Outfall 001
0.1	0.49	0.71
0.311	0.39	0.52
0.7	0.39	0.52

Design Flow (MGD)	Calculated Average Monthly Limit in mg/L (South Anna River) Outfalls 002/003	Calculated Average Weekly Limit in mg/L (South Anna River) Outfall 002/003	Calculated Average Monthly Limit in mg/L (South Anna River) Outfall 004	Calculated Average Weekly Limit in mg/L (South Anna River)
0.1	NA	NA	NA	NA
0.311	3.7	5.0	3.1	4.1
0.7	2.6	3.5	2.1	2.8

2) Total Residual Chlorine (Outfalls 002, 003, 004):
Chlorine will be used for disinfection of the pipeline to the South Anna River and hence, has the potential to be present in the discharge to the South Anna River. Staff calculated WLAs for total residual chlorine (TRC) using current critical flows and the mixing allowance. In accordance with current DEQ guidance, staff used a default data point of 0.2 mg/L and the calculated WLAs to derive limits. For Outfalls 002, 003, and 004, a monthly average limit of 0.009 mg/L and a weekly average limit of 0.011 mg/L are proposed for this discharge at both the 0.311 MGD and 0.7 MGD design flow tiers (see **Attachment 10**).

3) Metals/Organics:
DMR effluent data from the first quarter of 2009 through the third quarter of 2012 were used to recalculate metals limits. Limits were re-evaluated based on the more recent sampling data as earlier data may be considered suspect. See Section 27 of this fact sheet for additional information concerning enforcement actions that resulted from failing to use appropriate laboratory practices and controls. Using the more recent data, it was found that limits are still needed for total recoverable copper and total recoverable zinc. Limits calculated for the discharge at the Camp Creek Impoundment are 6.5 µg/L and 53 µg/L for total recoverable copper and total recoverable zinc, respectively. Metals limits calculated for discharge at the South Anna River are shown in Tables 6 and 7 below. The receiving stream flow values at Outfall 004 are slightly higher than those derived for Outfalls 002 and 003 (see **Attachment 1**). However, the limits derived for copper and zinc were the same as those at Outfalls 002 and 003.

TABLE 6
CALCULATED COPPER LIMITS

Design Flow (MGD)	Calculated Average Monthly Limit in µg/L (Camp Creek Impoundment)	Calculated Average Weekly Limit in µg/L (Camp Creek Impoundment)	Calculated Average Monthly Limit in µg/L (South Anna River)	Calculated Average Weekly Limit in µg/L (South Anna River)
0.1	6.5	6.5	NA	NA
0.311	6.5	6.5	26	26
0.7	6.5	6.5	26	26

TABLE 7
CALCULATED ZINC LIMITS

Design Flow (MGD)	Calculated Average Monthly Limit in µg/L (Camp Creek Impoundment)	Calculated Average Weekly Limit in µg/L (Camp Creek Impoundment)	Calculated Average Monthly Limit in µg/L (South Anna River)	Calculated Average Weekly Limit in µg/L (South Anna River)
0.1	53	53	NA	NA
0.311	53	53	210	210
0.7	53	53	210	210

d. Effluent Limitations and Monitoring, Outfalls 001, 002/ 003/ 004 – Conventional and Non-Conventional Pollutants
No changes to the Dissolved Oxygen (D.O.), Carbonaceous Biochemical Oxygen Demand-5 day ($CBOD_5$), Total Suspended Solids (TSS), Total Kjeldahl Nitrogen (TKN), *E. coli,* Total Phosphorus (TP), , and pH limitations are proposed for the 0.1 MGD design flow tier at the Camp Creek Impoundment discharge location.

The monthly average and weekly average concentration limits for TSS will be changed from 15 mg/L and 23 mg/L to 10 mg/L and 15 mg/L when the CTO for the 0.0311 MGD facility is issued since the technology installed should be able to remove TSS to this level. These TSS concentrations limits shall remain at the 0.7 MGD design flow tier. No changes to the D.O., $CBOD_5$, TSS, TKN, *E. coli,* TP, Total Nitrogen (TN), and pH limitations are proposed for the 0.311 MGD or 0.7 MGD design flow tiers at the Camp Creek Impoundment discharge location (Outfall 001).

$cBOD_5$, TSS, and TKN limitations for discharge to the Camp Creek impoundment are based on best professional judgment and Guidance Memo 00-2011. This guidance is applicable to waters such as the Camp Creek Impoundment that cannot be modeled. Modeling of the South Anna River in the areas of the proposed discharges using the limits of 10 mg/L for $CBOD_5$ and TSS and 3.0 mg/L for TKN shows that the water quality standards for D.O. are met directly downstream of the proposed discharges. Therefore, the $CBOD_5$, TSS, and TKN limits currently in the permit for the discharge to the Camp Creek impoundment shall remain in the permit when the discharge is moved to the South Anna River.

The D.O. limit is set at 7.0 mg/L to protect the Camp Creek Impoundment. The D.O. limit shall change to 6.0 mg/L when the facility discharges to the South Anna River because modeling illustrates that water quality standards are protected when a D.O. limit of 6.0 mg/L is in place at the South Anna River Outfall 002 discharge location (see **Attachment 11**).

pH limitations are set at the water quality criteria.

E. coli limitations are in accordance with the Water Quality Standards 9VAC25-260-170.

e. Effluent Annual Average Limitations and Monitoring, Outfalls 001 and 002/003/004 – Nutrients
VPDES Regulation 9VAC25-31-220(D) requires effluent limitations that are protective of both the numerical and narrative water quality standards for state waters, including the Chesapeake Bay.

As discussed in Section 15, significant portions of the Chesapeake Bay and its tributaries are listed as impaired with nutrient enrichment cited as one of the primary causes. Virginia has committed to protecting and restoring the Bay and its tributaries. Only concentration limits are now included in the individual VPDES permit when the facility installs nutrient removal technology. The basis for the limitations is 9VAC25-40, *Regulation for Nutrient Enriched Waters and Dischargers within the Chesapeake Bay Watershed,* which requires new or expanding discharges with design flows of $\geq$ 0.04 MGD to treat for TN and TP to either BNR levels (TN = 8 mg/L; TP = 1.0 mg/L) or SOA levels (TN = 3.0 mg/L and TP = 0.3 mg/L).

This facility has also obtained coverage under 9VAC25-820, *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia.* This regulation specifies and controls the nitrogen and phosphorus loadings from facilities and specifies facilities that must register under the general permit. Nutrient loadings for those facilities registered under the general permit as well as compliance schedules and other permit requirements shall be authorized, monitored, limited and otherwise regulated under the general permit--not this individual permit. This facility has coverage under VAN030154 – The Louisa County Water Authority Aggregate Nutrient Discharge General Permit. TN and TP Annual loads from this facility are found in 9VAC25-720, *Water Quality Management Plan Regulation,* which sets forth TN and TP maximum wasteload allocations for facilities designated as significant discharges; i.e., those with design flows of $\geq$ 0.5 MGD above the fall line and $\geq$ 0.1 MGD below the fall line.

Monitoring for Nitrates + Nitrites, TKN, TN and TP is included in this permit. The monitoring is needed to ensure protection the Water Quality Standards of the Chesapeake Bay. Monitoring frequencies for Nitrates + Nitrites, TN, and TP reflect those set forth in 9VAC25-820. The monitoring frequency for TKN is equivalent to that of $cBOD_5$ and TSS since this monitoring is also used in lieu of ammonia monitoring and reflects the recommendations in the VPDES Permit Manual. Annual average effluent limitations and monthly and year to date calculations for TN and TP are included in this individual permit.
The annual averages are based on the offset plan submitted as part of the Registration Statement for 9VAC25-820, VAC25-40, and DEQ Guidance Memo 7-2008.

The monthly phosphorus limitations present when the discharge is to an impoundment of Camp Creek are based on staff's best professional judgment. It is staff's experience that sewage treatment plant discharges without phosphorus controls will cause algal blooms in ponds, small impoundments and still waters in general. Since there is no model or chlorophyll criteria by which to derive a phosphorus limit, staff use their experience with facilities that must comply with the 2.0 mg/L requirements of the Nutrient Policy and require the same limit. This limit has been shown to provide sufficient phosphorus control to avoid nuisance algal blooms. The regulatory basis for this approach is 9VAC25-31-220.D.

f. Effluent Limitations and Monitoring Summary

The effluent limitations are presented in the following tables. Limits were established for $cBOD_5$, TSS, TKN, pH, D.O., TP, *E. coli*, total recoverable copper, and total recoverable zinc. Monitoring for total hardness is included. At the 0.311 MGD and 0.70 design flow tiers, limits were established for $cBOD_5$, TSS, TKN, pH, D.O., TP, TN, *E. coli*, total recoverable copper, and total recoverable zinc. Monitoring for Nitrates + Nitrites and total hardness is included. Since the pipeline to the South Anna River is being chlorinated, limits for TRC are required when the facility discharges to the South Anna River.

The mass loading (kg/d) for monthly and weekly averages were calculated by multiplying the concentration values (mg/L), with the flow values (in MGD) and then a conversion factor of 3.785.

The mass loading (lb/d) for TKN and TP monthly and weekly averages were calculated by multiplying the concentration values (mg/L), with the flow values (in MGD) and then a conversion factor of 8.345.

Sample Type and Frequency are in accordance with the recommendations in the VPDES Permit Manual and 9VAC25-820.

The VPDES Permit Regulation at 9VAC25-31-30 and 40 CFR Part 133 require that the facility achieve at least 85% removal for BOD/cBOD and TSS (or 65% for equivalent to secondary). The limits in this permit are water-quality-based effluent limits and result in greater than 85% removal.

18. Antibacksliding:

Aside from metals, all limits in the proposed permit are at least as stringent as those established in the previous permit reissuance. With regard to metals, the proposed limits for the South Anna River discharge location are less stringent than those established for the Camp Creek impoundment. However, the South Anna River is a new discharge location and the proposed limits are protective of water quality at this location. Limits for the discharge to the Camp Creek impoundment have been given an extended compliance schedule as explained in Section 20.b. of this Fact Sheet consistent with 9VAC25-31-220.L.2.c of the VPDES regulations.

19.a Effluent Limitations/Monitoring Requirements (Outfall 001):

Design flow is 0.1 MGD.

Effective Dates: During the period beginning with the permit's effective date and lasting until the issuance of the CTO for the 0.311 MGD facility or the permit expiration date.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH	2	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
$cBOD_5$	1,2	10 mg/L 3.8 kg/day	15 mg/L 5.7 kg/day	NA	NA	1/W	4H-C
Total Suspended Solids (TSS)	1,2	15 mg/L 5.7 kg/day	23 mg/L 8.7 kg/day	NA	NA	1/W	4H-C
Dissolved Oxygen (D.O.)	2	NA	NA	7.0 mg/L	NA	1/D	Grab
Total Kjeldahl Nitrogen (TKN)	1,2	3.0 mg/L 2.5 lb/day	4.5 mg/L 3.8 lb/day	NA	NA	1/W	4H-C
E. coli (Geometric Mean) [a]	2	126 n/100 mL	NA	NA	NA	2D/W	Grab
Total Phosphorus	2	2.0 mg/L 1.7 lbs/day	3.0 mg/L 2.5 lb/day	NA	NA	1/W	4H-C
Copper, Total Recoverable	2	6.5 µg/L[b]	6.5 µg/L[b]	NA	NA	(b)	Grab
Zinc, Total Recoverable	2	53 µg/L[b]	53 µg/L[b]	NA	NA	(b)	Grab
Total Hardness[c]	2	NL (mg/L)	NA	NA	NA	(b)	Grab
Chronic Toxicity – *C. dubia* (TU_c)	NA	NA	NA	NA	NL	1/3M[d]	4H-C
Chronic Toxicity – *P. promelas* (TU_c)	NA	NA	NA	NA	NL	1/3M[d]	4H-C

The basis for the limitations codes are:

1. Best Professional Judgment
2. Water Quality Standards

MGD = Million gallons per day.
NA = Not applicable.
NL = No limit; monitor and report.
TIRE = Totalizing, indicating and recording equipment.
S.U. = Standard units.

1/D = Once every day.
1/W = Once per week.
2D/W = Two days per week.
1/M = Once per month.
1/3M = Once per every 3 months.

4H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the monitored 4-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of 4 (four) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum 4 (four) grab samples obtained at hourly or smaller intervals may be collected where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by 10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

(a) Samples shall be collected between the hours of 10 A.M. and 4 P.M.

(b) See Compliance Schedule in Part I.C. of the permit.

(c) To be measured at the time metals samples are taken.

(d) See Part I.E. of the permit.

19.b Effluent Limitations/Monitoring Requirements (Outfall 001):

Design flow is 0.311 MGD.

Effective Dates: During the period beginning with the issuance of the CTO for the 0.311 MGD facility and lasting until the issuance of the CTO for the South Anna River discharge location, the issuance of the CTO for the 0.7 MGD facility, or the permit expiration date.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH	2	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
$cBOD_5$	1,2	10 mg/L 12 kg/day	15 mg/L 18 kg/day	NA	NA	3D/W	8H-C
Total Suspended Solids (TSS)	1,2	10 mg/L 12 kg/day	15 mg/L 18 kg/day	NA	NA	3D/W	8H-C
Dissolved Oxygen (DO)	2	NA	NA	7.0 mg/L	NA	1/D	Grab
Total Kjeldahl Nitrogen (TKN)	1,2,3	3.0 mg/L 7.8 lb/day	4.5 mg/L 12 lb/day	NA	NA	3D/W	8H-C
E. coli (Geometric Mean) [a]	2	126/100mls	NA	NA	NA	3D/W	Grab
Nitrate+Nitrite, as N	3	NL mg/L	NA	NA	NA	2/M	8H-C
Total Nitrogen [b]	3	NL mg/L	NA	NA	NA	2/M	Calculated
Total Nitrogen – Year to Date [b]	3	NL mg/L	NA	NA	NA	2/M	Calculated
Total Nitrogen – Calendar Year [b]	3	6.0 mg/L	NA	NA	NA	1/YR	Calculated
Total Phosphorus	2,3	2.0 mg/L 5.2 lb/day	3.0 mg/L 7.8 lb/day	NA	NA	1/W	8H-C
Total Phosphorus – Year to Date [b]	3	NL mg/L	NA	NA	NA	1/M	Calculated
Total Phosphorus – Calendar Year [b]	3	0.6 mg/L	NA	NA	NA	1/YR	Calculated
Copper, Total Recoverable	2	6.5 µg/L[c]	6.5 µg/L[c]	NA	NA	(c)	Grab
Zinc, Total Recoverable	2	53 µg/L[c]	53 µg/L[c]	NA	NA	(c)	Grab
Total Hardness [d]	2	NL mg/L	NA	NA	NA	(c)	Grab
Chronic Toxicity – *C. dubia* (TU_c)	NA	NA	NA	NA	NL	1/3M[e]	8H-C
Chronic Toxicity – *P. promelas* (TU_c)	NA	NA	NA	NA	NL	1/3M[e]	8H-C

The basis for the limitations codes are:

1. Best Professional Judgment
2. Water Quality Standards
3. 9VAC25-40 (Nutrient Regulation)

MGD = Million gallons per day.
NA = Not applicable.
NL = No limit; monitor and report.
TIRE = Totalizing, indicating and recording equipment.
S.U. = Standard units.

1/D = Once every day.
3D/W = Three days per week.
2/M = Twice per month, >7 days apart.
1/YR = Once per year.
1/W = Once per week.
1/M = Once per month.
1/3M = Once per every three months.

8H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the monitored 8-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of eight(8) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum eight (8) grab samples obtained at hourly or smaller intervals may be collected where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by 10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

(a) Samples shall be collected between the hours of 10 A.M. and 4 P.M.

(b) See Part I.B.3 of the permit for nutrient reporting calculations. Total Nitrogen = Sum of TKN and NO_2+NO_3 N and shall be calculated from the results of those tests.

(c) See Compliance Schedule in Part I.C. of this permit.

(d) To be measured at the time metals samples are taken.

(e) See Part I.E. of the permit.

19.c Effluent Limitations/Monitoring Requirements (Outfall 001):

Design flow is 0.7 MGD.

Effective Dates: During the period beginning with the issuance of the CTO for the 0.7 MGD facility and lasting until issuance of the CTO for the South Anna River discharge location or the permit expiration date.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH	2	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
$cBOD_5$	1,2	10 mg/L 26 kg/day	15 mg/L 40 kg/day	NA	NA	3D/W	8H-C
Total Suspended Solids (TSS)	1,2	10 mg/L 26 kg/day	15 mg/L 40 kg/day	NA	NA	3D/W	8H-C
Dissolved Oxygen (DO)	2	NA	NA	7.0 mg/L	NA	1/D	Grab
Total Kjeldahl Nitrogen (TKN)	1,2,3	3.0 mg/L 18 lb/day	4.5 mg/L 26 lb/day	NA	NA	3D/W	8H-C
E. coli (Geometric Mean) [a]	2	126 n/100 mL	NA	NA	NA	3D/W	Grab
Nitrate+Nitrite, as N	3	NL mg/L	NA	NA	NA	2/M	8H-C
Total Nitrogen [b]	3	NL mg/L	NA	NA	NA	2/M	Calculated
Total Nitrogen – Year to Date [b]	3	NL mg/L	NA	NA	NA	2/M	Calculated
Total Nitrogen – Calendar Year [b]	3	3.4 mg/L	NA	NA	NA	1/YR	Calculated
Total Phosphorus	3	2.0 mg/L 12 lb/day	3.0 mg/L 18 lb/day	NA	NA	1/W	8H-C
Total Phosphorus – Year to Date [b]	3	NL mg/L	NA	NA	NA	1/M	Calculated
Total Phosphorus – Calendar Year [b]	3	0.4 mg/L	NA	NA	NA	1/YR	Calculated
Copper, Total Recoverable	2	6.5 µg/L[c]	6.5 µg/L[c]	NA	NA	(c)	Grab
Zinc, Total Recoverable	2	53 µg/L[c]	53 µg/L[c]	NA	NA	(c)	Grab
Total Hardness [d]	2	NL mg/L	NA	NA	NA	(c)	Grab
Chronic Toxicity – *C. dubia* (TU_c)	NA	NA	NA	NA	NL	1/3M[e]	8H-C
Chronic Toxicity – *P. promelas* (TU_c)	NA	NA	NA	NA	NL	1/3M[e]	8H-C

The basis for the limitations codes are:

1. Best Professional Judgment
2. Water Quality Standards
3. 9VAC25-40 (Nutrient Regulation)

MGD = Million gallons per day.
NA = Not applicable.
NL = No limit; monitor and report.
TIRE = Totalizing, indicating and recording equipment.
S.U. = Standard units.

1/D = Once every day.
3D/W = Three days per week.
2/M = Twice per month, > 7 days apart.
1/W = Once per week.
1/YR = Once per year.
1/M = Once per month.
1/3M = Once per every 3 months.

8H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the monitored 8-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of eight(8) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum eight (8) grab samples obtained at hourly or smaller intervals may be collected where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by 10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

(a) Samples shall be collected between the hours of 10 A.M. and 4 P.M. at a minimum of 36 hours apart.

(b) See Part I.B.3 of the permit for nutrient reporting calculations. Total Nitrogen = Sum of TKN and NO_2+NO_3 N and shall be calculated from the results of those tests.

(c) See Compliance Schedule in Part I.C. of the permit.

(d) To be measured at the time metals samples are taken.

(e) See Part I.E. of the permit.

19.d Effluent Limitations/Monitoring Requirements (Outfalls 002, 003, 004):

Design flow is 0.311 MGD.

Effective Dates: During the period beginning with the issuance of the CTO for the 0.311 MGD facility and subsequent issuance of the CTO for the South Anna River discharge location and lasting until the issuance of the CTO for the 0.7 MGD facility or the permit expiration date.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH	2	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
$cBOD_5$	1,2,3	10 mg/L 12 kg/day	15 mg/L 18 kg/day	NA	NA	3D/W	8H-C
Total Suspended Solids (TSS)	1,2	10 mg/L 12 kg/day	15 mg/L 18 kg/day	NA	NA	3D/W	8H-C
Dissolved Oxygen (DO)[a]	1,2,3	NA	NA	6.0 mg/L	NA	1/D	Grab
Total Kjeldahl Nitrogen (TKN)	1,2,3,4	3.0 mg/L 7.8 lb/day	4.5 mg/L 12 lb/day	NA	NA	3D/W	8H-C
E. coli (Geometric Mean) [a,b]	2	126/100mls	NA	NA	NA	3D/W	Grab
Total Residual Chlorine (after dechlorination)[c]	2	0.009 mg/L	0.011 mg/L	NA	NA	1/D	Grab
Nitrate+Nitrite, as N	4	NL mg/L	NA	NA	NA	2/M	8H-C
Total Nitrogen [d]	4	NL mg/L	NA	NA	NA	2/M	Calculated
Total Nitrogen – Year to Date [d]	4	NL mg/L	NA	NA	NA	2/M	Calculated
Total Nitrogen – Calendar Year [d]	4	6.0 mg/L	NA	NA	NA	1/YR	Calculated
Total Phosphorus	4	NL mg/L	NA	NA	NA	2/M	8H-C
Total Phosphorus – Year to Date [d]	4	NL mg/L	NA	NA	NA	1/M	Calculated
Total Phosphorus – Calendar Year [d]	4	0.6 mg/L	NA	NA	NA	1/YR	Calculated
Copper, Total Recoverable	2	26 µg/L	26 µg/L	NA	NA	1/M	Grab
Zinc, Total Recoverable	2	210 µg/L	210 µg/L	NA	NA	1/M	Grab
Total Hardness [e]	2	NL mg/L	NA	NA	NA	1/M	Grab
Chronic Toxicity – *C. dubia* (TU_c)	NA	NA	NA	NA	NL	1/3M[f]	8H-C
Chronic Toxicity – *P. promelas* (TU_c)	NA	NA	NA	NA	NL	1/3M[f]	8H-C

The basis for the limitations codes are:

1. Best Professional Judgment
2. Water Quality Standards
3. Stream Model (**Attachment 11**)
4. 9VAC25-40 (Nutrient Regulation)

MGD = Million gallons per day.
NA = Not applicable.
NL = No limit; monitor and report.
TIRE = Totalizing, indicating and recording equipment.
S.U. = Standard units.

1/D = Once every day.
3D/W = Three days per week.
2/M = Twice per month, 7 days apart.
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1/W = Once per week.
1/M = Once per month.
1/3M = Once per every 3 months.

8H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the monitored 8-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of eight (8) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum eight (8) grab samples obtained at hourly or smaller intervals may be collected where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by 10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

(a) To be measured after all treatment and at the South Anna River outfall discharge location

(b) Samples shall be collected between the hours of 10 A.M. and 4 P.M.

(c) To be measured at the South Anna River outfall discharge location.

(d) See Part I.B.3 of the permit for nutrient reporting calculations. Total Nitrogen = Sum of TKN and NO_2+NO_3 N and shall be calculated from the results of those tests.

(e) To be measured at the time metals samples are taken.

(f) See Part I.E. of the permit.

19.e Effluent Limitations/Monitoring Requirements (Outfalls 002, 003, 004):

Design flow is 0.7 MGD.

Effective Dates: During the period beginning with the issuance of the CTO for the 0.7 MGD facility and subsequent issuance of the CTO for the South Anna River discharge location and lasting until the permit expiration date.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH	2	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
$cBOD_5$	1,2,3	10 mg/L 26 kg/day	15 mg/L 40 kg/day	NA	NA	3D/W	8H-C
Total Suspended Solids (TSS)	1,2	10 mg/L 26 kg/day	15 mg/L 40 kg/day	NA	NA	3D/W	8H-C
Dissolved Oxygen (DO)[a]	1,2,3	NA	NA	6.0 mg/L	NA	1/D	Grab
Total Kjeldahl Nitrogen (TKN)	1,2,3 4	3.0 mg/L 18 lb/day	4.5 mg/L 26 lb/day	NA	NA	3D/W	8H-C
E. coli (Geometric Mean) [a,b]	2	126 n/100 mL	NA	NA	NA	3D/W	Grab
Total Residual Chlorine (measured after dechlorination)[c]	2	0.009 mg/L	0.011 mg/L	NA	NA	1/D	Grab
Nitrate+Nitrite, as N	4	NL mg/L	NA	NA	NA	2/M	8H-C
Total Nitrogen [d]	4	NL mg/L	NA	NA	NA	2/M	Calculated
Total Nitrogen – Year to Date [d]	4	NL mg/L	NA	NA	NA	2/M	Calculated
Total Nitrogen – Calendar Year [d]	4	3.4 mg/L	NA	NA	NA	1/YR	Calculated
Total Phosphorus	4	NL mg/L	NA	NA	NA	2/M	8H-C
Total Phosphorus – Year to Date [d]	4	NL mg/L	NA	NA	NA	1/M	Calculated
Total Phosphorus – Calendar Year [d]	4	0.4 mg/L	NA	NA	NA	1/Y	Calculated
Copper, Total Recoverable	2	26 µg/L	26 µg/L	NA	NA	1/M	Grab
Zinc, Total Recoverable	2	210 µg/L	210 µg/L	NA	NA	1/M	Grab
Total Hardness [e]	2	NL mg/L	NA	NA	NA	1/M	Grab
Chronic Toxicity – *C. dubia* (TU_c)	NA	NA	NA	NA	NL	1/3M[f]	8H-C
Chronic Toxicity – *P. promelas* (TU_c)	NA	NA	NA	NA	NL	1/3M[f]	8H-C

The basis for the limitations codes are:

1. Best Professional Judgment
2. Water Quality Standards
3. Stream Model (**Attachment 11**)
4. 9VAC25-40 (Nutrient Regulation)

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8H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the monitored 8-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of eight(8) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum eight (8) grab samples obtained at hourly or smaller intervals may be collected where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by 10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

(a) To be measured after all treatment and at the South Anna River outfall discharge location

(b) Samples shall be collected between the hours of 10 A.M. and 4 P.M.

(c) To be measured at the South Anna River outfall discharge location.

(d) See Part I.B.3 of the permit for nutrient reporting calculations. Total Nitrogen = Sum of TKN and NO_2+NO_3 N and shall be calculated from the results of those tests.

(e) To be measured at the time metals samples are taken.

(f) See Part I.E. of the permit.

20. Other Permit Requirements:

a. Permit Section Part I.B. contains quantification levels and compliance reporting instructions.
9VAC25-31-190.L.4.c. requires an arithmetic mean for measurement averaging and 9VAC25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Specific analytical methodologies for toxics are listed in this permit section as well as quantification levels (QLs) necessary to demonstrate compliance with applicable permit limitations or for use in future evaluations to determine if the pollutant has reasonable potential to cause or contribute to a violation. Required averaging methodologies are also specified.

The calculations for the Nitrogen and Phosphorus parameters shall be in accordance with the calculations set forth in 9VAC25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia.* §62.1-44.19:13 of the Code of Virginia define how annual nutrient loads are to be calculated; this is carried forward in 9VAC25-820-70. As annual concentrations (as opposed to loads) are limited in the individual permit, these reporting calculations are intended to reconcile the reporting calculations between the permit programs, as the permittee is collecting a single set of samples for the purpose of ascertaining compliance with two permits.

b. Permit Section Part I.C. details the requirements for a Schedule of Compliance.
The VPDES Permit Regulation 9VAC25-31-250 allows use of compliance schedules to provide facilities sufficient time for upgrades to meet newly established effluent limits. The permit reissued on December 4, 2008, contained newly established limits for total recoverable copper and total recoverable zinc. The facility is encountering difficulty in meeting these limits at the current discharge location to the impoundment of Camp Creek.

A primary purpose of this permitting action is to recognize and address the difficulties the facility has encountered meeting the metals effluent limits. The VPDES permit effective December 4, 2008, established a 4-year compliance schedule for total recoverable copper and total recoverable zinc with a requirement to provide annual progress reports on attainment of final limits. The limits become effective on December 4, 2012. As documented in the annual compliance report dated January 10, 2012, as well as correspondence dated June 8, 2012, and July 10, 2012, the Authority determined that treatment for control and removal of metals to meet permit limits is not feasible, and that there are also no feasible alternative drinking water supplies that may have lower copper and zinc levels. It should be noted that the source wells for the Zion Crossroads area contain significant concentrations of zinc and copper.

The Authority has committed to reusing their effluent to the maximum extent possible. As discussed previously, they are planning an approximate 8-10 mile pipe to make their effluent available to as many potential users as possible. The pipe will terminate at the South Anna River. This plan will also allow the Authority to comply with its metal limits by relocating the discharge from its current location into the impoundment of Camp Creek to one of three possible locations on the South Anna River. This remedy to the metals compliance schedule is authorized by this permitting action and is consistent with the November 5, 2012, Consent Decree resolving the legal challenge between The Historic Green Springs Inc; Reginald Murphy and Jane Stuart Murphy (plaintiffs) v. Louisa County Water Authority (defendant) brought in United States District Court for the Western District of Virginia. This Consent Decree is included as **Attachment 12.**

This permitting action extends the schedule of compliance beyond the initial four year compliance schedule for total recoverable copper and total recoverable zinc to November 5, 2016, to allow time to construct the pipe to relocate the outfall and maximize reuse. As noted, the metals limits become effective December 4, 2012. Staff is proposing to establish and extend a compliance schedule recognizing it is effective and efficient to allow the facility time to comply through this permitting action, and that the County is moving forward with the ultimate solution.

Additionally, it should be noted that anti-backsliding is not triggered by extending the compliance schedule. 9VAC25-31-220.L.2.c allows a less stringent effluent limit to be established from a prior permit when there is no reasonably available remedy. In this circumstance, the available remedy requires additional time to implement. Staff recognizes the good faith effort of the County in pursuing solutions to comply with the permit, and is proposing a compliance schedule that will afford the County the time needed to achieve final compliance.

The facility should meet the proposed total recoverable copper and total recoverable zinc limits through construction of a pipeline to a new discharge location at the South Anna River by November 5, 2016. The permittee shall achieve compliance with the final limits specified in Part I.A. of the VPDES permit in accordance with Table 6 below as contained in Part I.C. of

the permit. Monitoring for total recoverable copper and total recoverable zinc shall be conducted once per quarter until a Certificate to Operate is issued for discharge to the South Anna River or November 5, 2016, whichever occurs first. Once compliance with final limits is achieved, monitoring for total recoverable copper and total recoverable zinc shall be conducted once per month.

TABLE 6 -- SCHDULE OF COMPLIANCE

ACTION	TIME FRAME
1. Report of progress on attainment of final limits.	First Annual Report due January 10, 2014. Second Annual Report due January 10, 2015. Third Annual Report due January 10, 2016.
2. Achieve compliance with final limits.	November 5, 2016

c. Permit Section Part I.D. details the requirements of a Pretreatment Program.
The VPDES Permit Regulation at 9VAC25-31-730. through 900., and the Federal Pretreatment Regulations found in 40 CFR Part 403, requires POTWs with a design flow of >5.0 MGD and receiving from Industrial Users (IUs) pollutants that pass through or interfere with the operation of the POTW or are otherwise subject to pretreatment standards to develop a pretreatment program.

This treatment works is a POTW with a current design capacity of 0.1 MGD and planned design flow expansions to 0.311 MGD and 0.7 MGD. Louisa County also owns and operates the Louisa Regional WWTF (0.4 MGD, with a proposed expansion to 0.8 MGD). The combined maximum design capacity for the POTWs owned by the county is 1.5 MGD. The Pretreatment Program for Louisa County was originally approved on February 7, 2012. Louisa County has one permitted Significant Industrial Users (SIUs) regulated through this program (Paul's Decorative Products) and four potential new SIUs (The Wal-Mart Distribution Center, Busada Manufacturing Corporation, Tetrapak Tubex, Inc., and Piedmont Metal Fabricators). The Wal-Mart Distribution Center is the only potential SIU that discharges to the Zion's Crossroads WWTP.

The pretreatment program conditions in the proposed permit revocation and reissuance will include: implementation of the approved pretreatment program that complies with the Clean Water Act, the State Water Control Law, state regulations and the approved program.

d. Permit Section Part I.E. details the requirements for Whole Effluent Toxicity.
The VPDES Permit Regulation at 9VAC25-31-210 requires monitoring and 9VAC25-31-220.I, requires limitations in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act. A toxics management program is imposed for municipal facilities with a design rate >1.0 MGD, with an approved pretreatment program or required to develop a pretreatment program, or those determined by the Board to need a program based on effluent variability, compliance history, instream waste concentration, and receiving stream characteristics. A pretreatment program for Louisa County was approved on February 7, 2012. All Whole Effluent Toxicity testing shall be conducted as set forth in Part I.E. of the permit. The WET testing will evaluate the toxicity characteristics of the effluent, regardless of the discharge location. Therefore, if the WET testing is conducted on the upgraded facility while discharging to the impountment to Camp Creek, it will not be required to perform the testing again should the outfall location to the South Anna River be completed, unless the treatment process is changed or the nature of the effluent has otherwise been altered, or the expansion to the 0.7 MGD flow tier has occurred.

21. Other Special Conditions:

a. 95% Capacity Reopener. The VPDES Permit Regulation at 9VAC25-31-200.B.4. requires all POTWs and PVOTWs develop and submit a plan of action to DEQ when the monthly average influent flow to their sewage treatment plant reaches 95% or more of the design capacity authorized in the permit for each month of any three consecutive month period. This facility is a POTW.

b. Indirect Dischargers. Required by VPDES Permit Regulation, 9VAC25-31-200 B.1. and B.2. for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

c. O&M Manual Requirement. Required by Code of Virginia §62.1-44.19; Sewage Collection and Treatment Regulations, 9VAC25-790; VPDES Permit Regulation, 9VAC25-31-190.E. The permittee shall maintain a current Operations and Maintenance (O&M) Manual for the treatment works that is in accordance with Virginia Pollutant Discharge Elimination System Regulations, 9VAC25-31 and the Sewage Collection and Treatment Regulations, 9VAC25-790.

d. CTC, CTO Requirement. The Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9VAC25-790 requires that all treatment works treating wastewater obtain a Certificate to Construct prior to commencing construction and to obtain a Certificate to Operate prior to commencing operation of the treatment works.

e. Licensed Operator Requirement. The Code of Virginia at §54.1-2300 et seq. and the VPDES Permit Regulation at 9VAC25-31-200.C., and Rules and Regulations for Waterworks and Wastewater Works Operators (18VAC160-20-10 et seq.) requires licensure of operators. This facility requires a Class II Operator at the 0.1 MGD and 0.311 MGD design flow tiers and a Class I Operator at the 0.7 MGD design flow tier.

A Class II operator is a sufficient skill level to operate the facility at a 0.1 MGD and a 0.311 MGD design flow tier and is consistent with the recommendation of the SCAT regulations. When the flow is increased to 0.7 MGD, a Class I operator is needed because the complexity of the facility will increase due to the addition of tertiary rapid mix, a flocculation basin, and extra UV banks. Additionally, the facility must begin meeting state of the art nutrient limits.

f. Reliability Class. The Sewage Collection and Treatment Regulations at 9VAC25-790 require sewage treatment works to achieve a certain level of reliability in order to protect water quality and public health consequences in the event of component or system failure. Reliability means a measure of the ability of the treatment works to perform its designated function without failure or interruption of service. The facility is required to meet Reliability Class I.

g. Water Quality Criteria Reopener. The VPDES Permit Regulation at 9VAC25-31-220 D. requires establishment of effluent limitations to ensure attainment/maintenance of receiving stream water quality criteria. Should effluent monitoring indicate the need for any water quality-based limitations, this permit may be modified or alternatively revoked and reissued to incorporate appropriate limitations.

h. Water Quality Criteria Monitoring. State Water Control Law §62.1-44.21 authorizes the Board to request information needed to determine the discharge's impact on State waters. States are required to review data on discharges to identify actual or potential toxicity problems or the attainment of water quality goals according to 40 CFR Part 131, Water Quality Standards, Subpart 131.11. To ensure that water quality criteria are maintained, the permittee is required to analyze the facility's effluent for the substances noted in Part D of EPA NPDES Permit Application Form 2A in accordance with Part I.F.8 of the permit.

i. Sludge Reopener. The VPDES Permit Regulation at 9VAC25-31-220.C. requires all permits issued to treatment works treating domestic sewage (including sludge-only facilities) include a reopener clause allowing incorporation of any applicable standard for sewage sludge use or disposal promulgated under Section 405(d) of the CWA. The facility includes a sewage treatment works.

j. Sludge Use and Disposal. The VPDES Permit Regulation at 9VAC25-31-100.P; 220.B.2., and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on their sludge use and disposal practices and to meet specified standards for sludge use and disposal. The facility includes a treatment works treating domestic sewage.

k. Nutrient Offsets. The Virginia General Assembly, in their 2005 session, enacted a new Article 4.02 (Chesapeake Bay Watershed Nutrient Credit Exchange Program) to the Code of Virginia to address nutrient loads to the Bay. Section 62.1-44.19:15 sets forth the requirements for new and expanded dischargers, which are captured by the requirements of the law, including the requirement that non-point load reductions acquired for the purpose of offsetting nutrient discharges be enforced through the individual VPDES permit.

l. E3/E4. 9VAC25-40-70 B authorizes DEQ to approve an alternate compliance method to the technology-based effluent concentration limitations as required by subsection A of this section. Such alternate compliance method shall be incorporated into the permit of an Exemplary Environmental Enterprise (E3) facility or an Extraordinary Environmental Enterprise (E4) facility to allow the suspension of applicable technology-based effluent concentration limitations during the period the E3 or E4 facility has a fully implemented environmental management system that includes operation of installed nutrient removal technologies at the treatment efficiency levels for which they were designed.

m. Nutrient Reopener. 9VAC25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. 9VAC25-31-390 A authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.

n. Discharge from Only One Outfall. Four outfall locations are specified in this permit reissuance. This special condition allows discharge from only one outfall location at a time.

o. TMDL Reopener. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL that may be developed and approved for the receiving stream.

22. **Permit Section Part II**. Part II of the permit contains standard conditions that appear in all VPDES Permits. In general, these standard conditions address the responsibilities of the permittee, reporting requirements, testing procedures and records retention.

23. **Permit Section Part III**. Part III of the permit contains standard conditions that appear in VPDES Permits that may be reusing reclaimed water. As of the drafting of this permitting action, the Zion Crossroads WWTP is in the process of a plant expansion to the 0.311 flow tier. While the design of the facility has been completed with an understanding of the requirements and standards of the Water Reclamation and Reuse Regulations, not all aspects of the water reclamation system have been finalized. The Spring Creek Golf Course is located near the WWTP, and it is anticipated that the golf course will be utilizing reclaimed water for irrigation as soon as 2013. Since all aspects of the reclamation system have not yet been finalized, the permittee was not able to complete all elements of the *Water Reclamation and Reuse Addendum to an Application for a VPDES Permit.* The permit requires the permittee to submit a complete Reclaimed Water Management Plan to DEQ-NRO at least 120 days prior to implementing reuse. DEQ approval of the Water Reclamation and Reuse Plan is required before reuse may begin.

24. **Changes to the Permit from the Previously Issued Permit:**

a. Special Conditions:
   1) The Water Reclamation and Reuse Special Conditions Section has been updated.
   2) The Water Quality Criteria Reopener and the Water Quality Criteria Monitoring Special Conditions have been added to the permit.
   3) The Class I Operator requirement has been changed to a Class II Operator requirement at the 0.1 MGD and 0.311 MGD design flow tiers.

b. Monitoring and Effluent Limitations:
   1) The total recoverable copper and total recoverable zinc limits for discharge to the Camp Creek Impoundment have been changed from 5.7 µg/L and 50 µg/L, respectively to 6.5 µg/L and 53 µg/L, respectively due to change in the effluent hardness value from 190 mg/L to 201 mg/L and use of new monitoring data.
   2) The TSS monitoring frequency at the 0.1 MGD design flow tier has been changed from five days per week to once per week and the TSS monitoring frequency at the 0.311 MGD design flow tier discharging to the impoundment of Camp Creek has been changed from five days per week to three days per week. These monitoring frequency are in conformance with the recommendations stated in the January 27, 2010 VPDES Permit Manual.
   3) The TSS concentration limits at the 0.311 MGD and 0.7 MGD design flow tiers discharging to the impoundment of Camp Creek have been changed from a monthly average of 15 mg/L and a weekly average of 23 mg/L to a monthly average of 10 mg/L and a weekly average of 15 mg/L. Once the CTO for the upgrade to 0.311 MGD is issued, the wastewater treatment plant should be able to meet these limits.
   5) Whole effluent toxicity monitoring has been added.
   6) The Total Phosphorus annual average concentration limit at the 0.311 MGD design flow tier has been changed from 0.7 mg/L to 0.6 mg/L to maintain an annual Total Phosphorus loading of no more than 609 lbs/yr allocated for the Zion Crossroads WWTP in the registration list found in 9VAC25-820-70 dated January 1, 2012.
   7) The Total Phosphorus and Total Nitrogen annual average concentration limits at the 0.7 MGD flow tier have been changed from 0.3 mg/L and 3 mg/L to 0.4 mg/L and 3.4 mg/L, respectively, to reflect the November 1, 2011, offset plan load allocation submitted by the LCWA based on the aggregation, or bubbling, of the loadings for the Zion Crossroads WWTP and the Louisa Regional STP.

c. Other:
   1) Discharge locations to the South Anna River have been added.
   2) The compliance schedule for total recoverable copper and total recoverable zinc has been authorized to November 5, 2016.
   3) Part II of the permit has been updated to include VELAP language.

25. **Variances/Alternate Limits or Conditions:** None

26. Public Notice Information:

First Public Notice Date: 11/15/2012 Second Public Notice Date: 11/22/2012

Public Notice Information is required by 9VAC25-31-280 B. All pertinent information is on file and may be inspected and copied by contacting the: DEQ Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193; Telephone No. (703) 583-3837; anna.westernik@deq.virginia.gov. See **Attachment 13** for a copy of the public notice document.

Persons may comment in writing or by email to the DEQ on the proposed permit action and may request a public hearing during the comment period. Comments shall include the name, address and telephone number of the writer and of all persons represented by the commenter/requester and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit. Requests for public hearings shall state 1) the reason why a hearing is requested; 2) a brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit; and 3) specific references, where possible, to terms and conditions of the permit with suggested revisions. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given. The public may request an electronic copy of the draft permit and fact sheet or review the draft permit and application at the DEQ Northern Regional Office by appointment.

27. Additional Comments:

Previous Board Action(s): On November 30, 2010, Louisa County signed a Consent Order for the Louisa Regional WWTP. Based on information collected by DEQ, the State Water Control Board concluded that the Louisa County Water Authority discharged treated sewage and municipal wastes from the Louisa Regional WWTP while concurrently failing to comply with the conditions of the Permit, by failing to practice proper O&M of the Plant and its appurtenances, and failing to use required laboratory procedures and controls.

On November 30, 2010, Louisa County signed a Consent Order for the Zion Crossroads WWTP. Based on information collected by DEQ, the State Water Control Board concluded that the Louisa County Water Authority discharged treated sewage and municipal wastes from the Zion Crossroads WWTP while concurrently failing to comply with the conditions of the Permit, VA Code 62.1-44.5, and 9VAC25-31-50.

A Supplemental Environmental Plan (SEP) for reuse of the sewage treatment plant effluent from the Zion Crossroads WWTP at the Spring Creek Golf Course was developed and is in the Consent Orders. See **Attachment 14** for Appendix A and B of the Consent Orders approved by the State Water Control Board on February 4, 2011.

Staff Comments: This permit is being revoked and reissued prior to the December 3, 2013 expiration date to incorporate replacement discharge locations to the South Anna River and authorize the metals compliance schedule until the pipeline to the South Anna River discharge location is completed.

Public Comment: No comments were received during the public notice.

EPA Checklist: The checklist can be found in **Attachment 15**.

Attachments

Attachment 1 -	Flow Frequency Determination at the South Anna River Outfall
Attachment 2	Facility Diagrams
Attachment 3	Aerial Photograph of the Camp Creek Impoundment
Attachment 4 -	Boswells Tavern/Ferncliff Topographic Maps
Attachment 5 -	Site Inspection Summary Dated August 10, 2012
Attachment 6 -	Planning Statement Dated June 8, 2012
Attachment 7 -	90th Percentile pH and Temperature Values
Attachment 8 -	Freshwater Water Quality Criteria and Wasteload Allocations
Attachment 9	Hardness Data
Attachment 10-	Limitations Calculations
Attachment 11 -	Stream Model
Attachment 12	Consent Decree Dated November 5, 2012
Attachment 13 -	Public Notice
Attachment 14-	Appendix A and B of the Consent Orders Approved by the State Water Control Board on February 4, 2011
Attachment 15	EPA Checklist

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

MEMORANDUM

Northern Regional Office

TO: File

FROM: Anna Westernik, Water Permit Writer

DATE: August 31, 2012

SUBJECT: Flow Frequencies for Proposed Outfalls 002, 003 and 004 of the Zion Crossroads WWTP at the South Anna River

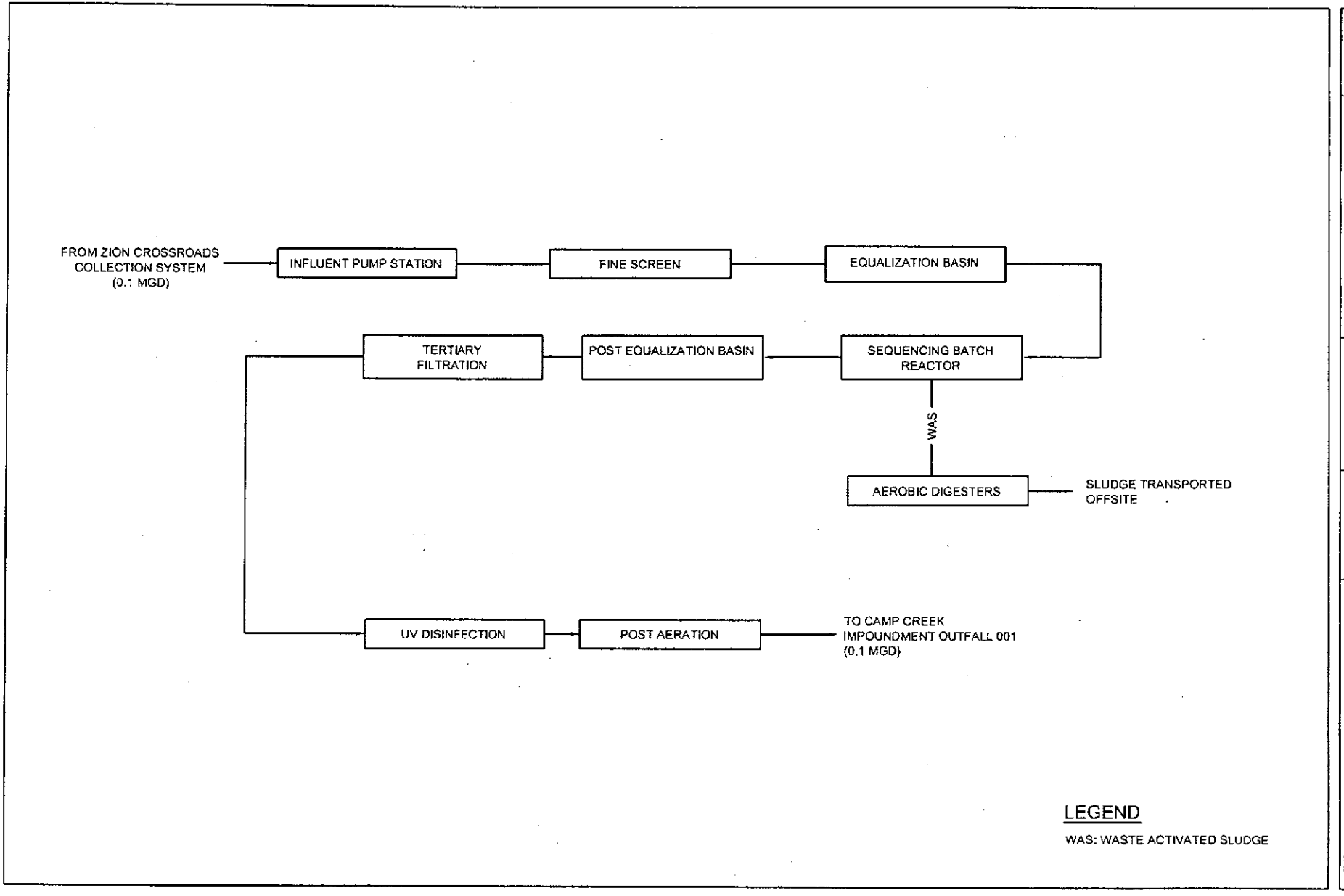
Flow Value	Monitoring Station #01673800 (cfs)	South Anna River at Proposed Outfalls 002 and 003 (cfs)	South Anna River at Proposed Outfalls 002 and 003 (MGD)
Drainage Area (mi^2)	77.4	92.3	92.3
Harm Mean	undefined	undefined	undefined
HF30Q10	12	14.31	9.25
HF7Q10	6	7.16	4.62
HF1Q10	4.3	5.13	3.31
30Q5	0.63	0.75	0.49
30Q10	0.26	0.31	0.20
7Q10	0.17	0.20	0.13
1Q10	0.12	0.14	0.09
1Q30	0.05	0.06	0.04

Monitoring Station #01673800 on the Po River was used in calculating drainage area comparisons.
The proposed Outfall No. will be located at 37° 59' 4.7" N/78° 07' 7.8" W.
High Flow Months are Dec-May.

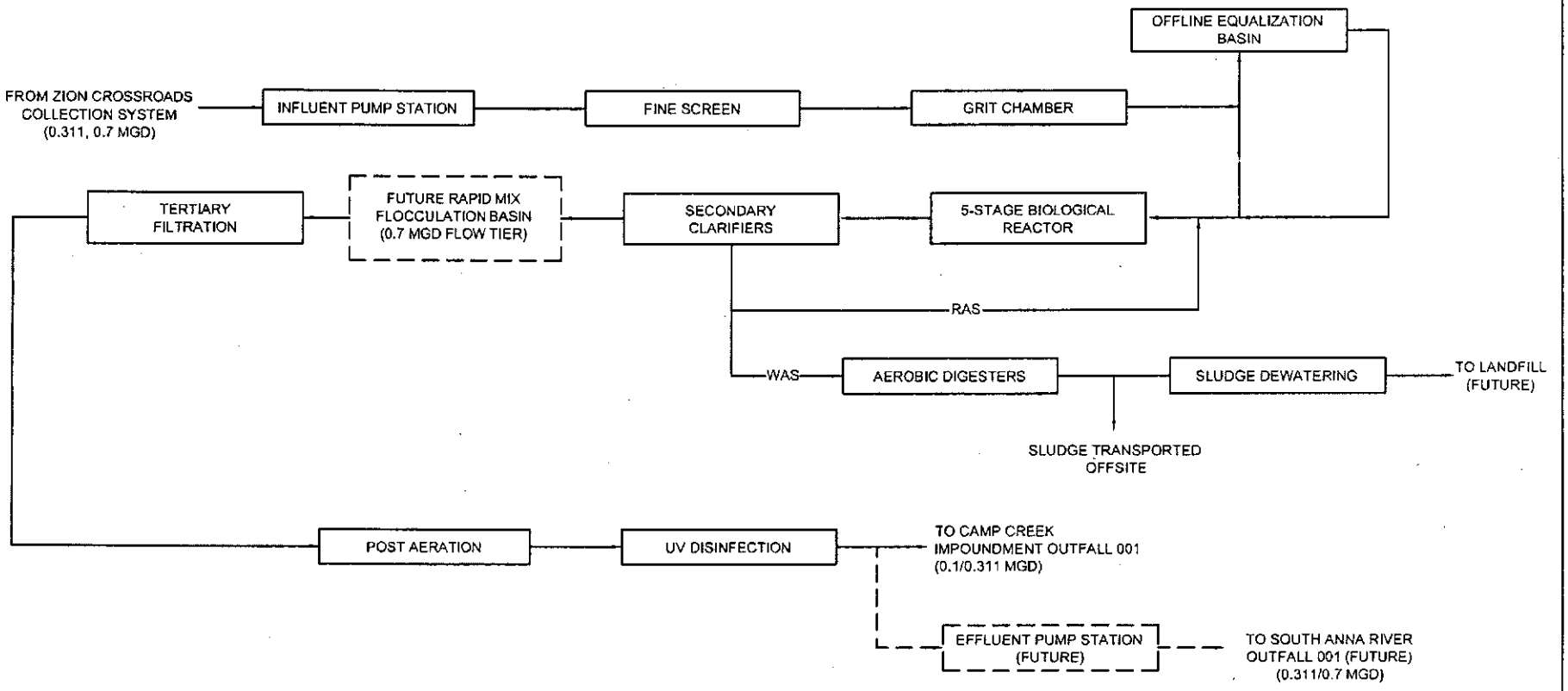
Attachment 1

Flow Value	Monitoring Station #01673800 (cfs)	South Anna River at Proposed Outfall 004 (cfs)	South Anna River at Proposed Outfall 004 (MGD)
Drainage Area (mi^2)	77.4	113.5	113.5
Harm Mean	undefined	undefined	undefined
HF30Q10	12	17.60	11.37
HF7Q10	6	8.80	5.69
HF1Q10	4.3	6.31	4.08
30Q5	0.63	0.92	0.60
30Q10	0.26	0.38	0.25
7Q10	0.17	0.25	0.16
1Q10	0.12	0.18	0.11
1Q30	0.05	0.07	0.05

Monitoring Station #01673800 on the Po River was used in calculating drainage area comparisons.
The proposed Outfall No. 4 will be located at 37° 58' 50.9" N/78° 02' 55.1" W.
High Flow Months are Dec-May.



Attachment 2



NOTE:
THE EXISTING PLANT SHOWN IN THIS EXHIBIT INCLUDES IMPROVEMENTS INCLUDED IN THE ZION CROSSROADS WASTEWATER TREATMENT PLANT EXPANSION PROJECT THAT IS CURRENTLY UNDER CONSTRUCTION.

LEGEND

RAS: RETURN ACTIVATED SLUDGE

WAS: WASTE ACTIVATED SLUDGE

FIGURE NO. 3B

TITLE B.3. PROCESS FLOW SCHEMATIC (0.311 & 0.7 MGD)

SCALE N.T.S.

PROJECT ZION CROSSROADS WWTP VPDES PERMIT APPLICATION

DATE JUNE 2012

PROJ. NO. 50053662

Dewberry
Dewberry & Davis, Inc.
4160 BIRKSLANE DRIVE
GLEN ALLEN, VA 23000
PHONE: 804.290.7907
FAX: 804.290.7923

Attachment 3

Aerial View of the Impoundment of Camp Creek

Attachment 4

Dewberry
Dewberry & Davis, Inc.
4180 Innslake Drive
Glen Allen, VA 23060
Ph: 804.290.7957 Fax: 804.290.7928
www.dewberry.com

DATE	TITLE	SHEET NO.
JUNE 2012	B.2. OVERALL TOPOGRAPHIC MAP	1
PROJ. NO. 50053662	PROJECT ZION CROSSROADS WWTP VPDES PERMIT APPLICATION	

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

MEMORANDUM

Northern Regional Office

TO: File

FROM: Anna Westernik, Water Permit Writer

DATE: August 10, 2012

SUBJECT: August 9, 2012 Site Visit to the Zion Crossroads WWTF (VA0090743) in Louisa County and sites Along the South Anna River

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On August 9, 2012, a site visit by DEQ personnel Anna Westernik and Bryant Thomas was made to the Zion Crossroads WWTF, a proposed discharge location on the South Anna River, and other locations on the South Anna River for the purpose of permit reissuance. DEQ personnel met with Pam Baughman of the Louisa County Service Authority before the tour of the South Anna River and the Zion Crossroads WWTP. Wesley Basore, Chief Operator for the Louisa County Service Authority, conducted the tour of the South Anna River sites and the facility.

Sites visited on the South Anna River included the proposed Outfall 004 discharge location at the Route 208 Bridge, the Byrd Mill Road River crossing, and the Poindexter Bridge River crossing.

The South Anna River at the 208 Bridge was approximately 50 feet wide and mildly meandering. The depth of the river varied from 6 inches to 2 feet but included pockets 4 to 5 feet deep. There has been a rainfall of approximately 1/4 inch the night before. The river bottom consisted of medium sized rocks with silt and mud interspersed. A school of fish was observed on the north side of the bridge. The water column had a muddied appearance, and a light volume of fixed algae was observed on the rock bottom.

At the Bryd Mill Road Bridge, the water column of the South Anna River had a muddied appearance and a significant volume of algae was observed at the river edges on the north side of the bridge. The river was approximately 50 to 80 feet wide and the river bottom was muddy. A small waterfall was observed of the North side of the bridge. Fish were present in this area.

The South Anna River at the Poindexter Mill Bridge was approximately 50 feet wide. The water column was muddied and a trace amount of brown algae was fixed to the rocks. The river bottom was muddy.

Some algae were observed in the current discharge area to an impoundment of Camp Creek. A small volume of effluent was entering the pond during the site visit. There appeared to be a substantial volume of water in the impoundment.

Attachment 5

Influent from the Spring Creek Subdivision flows via gravity where it is pumped with the influent from the commercial connections. Sewage from the pump station travels through a primary treatment unit consisting of two barscreens (one automatic and one manual that is used as a bypass). After screening, wastewater flows to two equalization basins that have just been placed on line and subsequently, one of the two sequencing batch reactor (SBR) units. A flow splitter is present to divert flow to either SBR. However, only one is used at this time. Within the SBR unit, wastewater is mixed with sludge and aerated, settled, and decanted for a given cycle of time. Effluent leaving the SBR unit flows to an equalization tank where it is reaerated. All effluent leaving the equalization tank travels through a cloth disk filter unit, a Parshall Flume where it is metered, and is then disinfected with ultraviolet radiation (UV) before being discharged to an impoundment of Camp Creek.

By April 30, 2013, the plant expansion to 0.311 MGD should be complete. The upgrade will consist of converting the existing SBR basins into aerobic digesters and installing an oxidation ditch/carrousel and secondary clarifiers for biological treatment. Since treatment is being changed from a SBR to an oxidation ditch, the following treatment processes will be needed: an upgraded influent pump station, a grit chamber, an oxidation ditch, secondary clarifiers, chemical feed facilities, a return activated sludge pumping station, a sludge dewatering building, tertiary filtration, additional UV banks, and diffused post aeration. At the time of this visit, equalization basins had been installed before secondary treatment and the new generator had been placed on line.

To:	Anna Westernik
From:	Jennifer Carlson
Date:	August 21, 2012
Subject:	Planning Statement for the Zion Crossroads WWTP
Permit Number:	VA0090743

Information for Outfall 001 when discharging to an impoundment on Camp Creek:

Discharge Type: Municipal
Discharge Flow: 0.1, 0.311 MGD
Receiving Stream: Camp Creek
Latitude / Longitude: 38° 00' 5.1"; 78° 11' 49.8"
Streamcode: 8-CMP
Waterbody: VAN-F01R
Water Quality Standards: Class III, Section 3
Rivermile: 3.2
Drainage Area: 3.69 mi^2

Information for proposed Outfall 002 to the South Anna River (downstream of Fosters Creek)

Discharge Type: Municipal
Discharge Flow: 0.311, 0.7 MGD
Receiving Stream: South Anna River
Latitude / Longitude: 37° 59' 34.7"; -78° 7' 7.8"
Streamcode: 8-SAR
Waterbody: VAN-F02R
Water Quality Standards: Class III, Section 3
Rivermile: 86.4
Drainage Area: 92.3 mi^2

Information for proposed Outfall 003 to the South Anna River (upstream of Rock Creek)

Discharge Type: Municipal
Discharge Flow: 0.311, 0.7 MGD
Receiving Stream: South Anna River
Latitude / Longitude: 37° 59' 19.5"; -78° 6' 42.1"
Streamcode: 8-SAR
Waterbody: VAN-F02R
Water Quality Standards: Class III, Section 3
Rivermile: 85.88
Drainage Area: 92.8 mi^2

Information for proposed Outfall 004 to the South Anna River (near Route 208)

Discharge Type: Municipal
Discharge Flow: 0.311, 0.7 MGD
Receiving Stream: South Anna River
Latitude / Longitude: 37° 58' 50.9"; -78° 2' 55.1"
Streamcode: 8-SAR
Waterbody: VAN-F02R
Water Quality Standards: Class III, Section 3
Rivermile: 80.44
Drainage Area: 113.5 mi^2

Attachment 6

For this planning statement, the information will be divided into Sections I, II, III, IV and V. Section I will include information for when the facility is discharging to the impounded waters of Camp Creek (Outfall 001). Section II will include information for the facility's proposed discharge to the South Anna River, Outfall 002, downstream of Fosters Creek. Section III will include information for the facility's proposed discharge to the South Anna River, Outfall 003, upstream of Rock Creek. Section IV will include information for the facility's proposed discharge, Outfall 004, to the South Anna River near Route 208. At no point will the facility be discharging to more than one outfall. Section V contains water quality information for segments of the South Anna River upstream of the proposed discharge locations.

Section I – Outfall 001; Receiving Waters: Camp Creek

1. Please provide water quality monitoring information for the receiving stream segment. If there is not monitoring information for the receiving stream segment, please provide information on the nearest downstream monitoring station, including how far downstream the monitoring station is from the outfall.

   The receiving stream is Camp Creek. There is no monitoring information available for the portion of Camp Creek that receives the discharge from VA00907432; however, there is monitoring data available on a further downstream segment of Camp Creek. The nearest downstream DEQ monitoring station on Camp Creek is Station 8-CMP000.28, located at the Route 717 bridge crossing. This station is located approximately 3.0 rivermiles downstream from Outfall 001. The following is a monitoring summary for this segment of Camp Creek, as taken from the Draft 2012 Integrated Assessment*:

   Class III, Section 3.

   DEQ ambient and biological monitoring station 8-CMP000.28 at Route 717.

   E. coli monitoring finds a bacterial impairment, resulting in an impaired classification for the recreation use. This impairment is nested within the downstream completed bacteria TMDL for the South Anna River. Biological monitoring finds benthic macroinvertebrate impairments, resulting in an impaired classification for the aquatic life use. The fish consumption and wildlife uses were not assessed.

   **The Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently being finalized and prepared for release.*

2. Does this facility discharge to a stream segment on the 303(d) list? If yes, please fill out Table A.

   No.

3. Are there any downstream 303(d) listed impairments that are relevant to this discharge? If yes, please fill out Table B.

   Yes.

Table B. Information on Downstream 303(d) Impairments and TMDLs

Waterbody Name	Impaired Use	Cause	Distance From Outfall	TMDL completed	WLA	Basis for WLA	TMDL Schedule
Impairment Information in the Draft 2012 Integrated Report*							
Camp Creek	Recreation	*E. coli*	1.26 miles	Pamunkey River Bacteria 08/02/2006	1.22E+12 cfu/year *E. coli*	126 cfu/100ml ---- 0.7 MGD	N/A
	Aquatic Life	Benthic Macroinvertebrates	1.26 miles	No	N/A	N/A	2024

**The Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently being finalized and prepared for release.*

4. Could you please calculate the drainage area for the outfall?

   See text box at top of planning statement.

5. Is there monitoring or other conditions that Planning/Assessment needs in the permit?

   There is a completed downstream TMDL for the aquatic life use impairment for the Chesapeake Bay. However, the Bay TMDL and the WLAs contained within the TMDL are not addressed in this planning statement.

6. Fact Sheet Requirements – Please provide information regarding any drinking water intakes located within a 5 mile radius of the discharge point.

   There are no public water supply intakes within a 5 mile radius of this facility's outfall.

Section II – Outfall 002; Proposed Receiving Waters: South Anna River (downstream of Fosters Creek)

1. Please provide water quality monitoring information for the receiving stream segment. If there is not monitoring information for the receiving stream segment, please provide information on the nearest downstream monitoring station, including how far downstream the monitoring station is from the outfall.

   The proposed outfall would discharge into a segment of the South Anna River that is monitored and assessed. The DEQ monitoring station, 8-SAR089.35 is located 2.4 miles upstream of the proposed discharge location, at the Route 613 bridge crossing. The following is the water quality summary for this segment of the South Anna River, as taken from the Draft 2012 Integrated Report*:

   Class III, Section 3.

   DEQ ambient monitoring station 8-SAR089.35, at Route 613. Citizen Monitoring Station 8SAR-F02-HGSI.

E. coli monitoring finds a bacterial impairment, resulting in an impaired classification for the recreation use. This impairment is nested within the downstream completed bacteria TMDL for the South Anna River. The aquatic life use is considered fully supporting. The fish consumption use was not assessed.

The wildlife use information from the 2010 assessment is as follows:
The wildlife use is considered fully supporting.

The nearest downstream DEQ monitoring station from the proposed discharge location is 8-SAR076.10, located in the Route 604 bridge crossing, approximately 9.8 miles downstream of the proposed outfall.

**The Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently being finalized and prepared for release.*

2. Does this facility discharge to a stream segment on the 303(d) list? If yes, please fill out Table A.

   Yes.

Table A: Impairment and TMDL information for the receiving stream segment.

Waterbody Name	Impaired Use	Cause	Distance From Outfall	TMDL completed	WLA	Basis for WLA	TMDL Schedule
Impairment Information in the Draft 2012 Integrated Report*							
South Anna River	Recreation	*E. coli*	0.0 miles	Pamunkey River Bacteria 08/02/2006	1.22E+12 cfu/year *E. coli*	126 cfu/100ml --- 0.7 MGD	N/A

**The Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently being finalized and prepared for release.*

3. Are there any downstream 303(d) listed impairments that are relevant to this discharge? If yes, please fill out Table B.

   No.

4. Could you please calculate the drainage area for the outfall?

   See text box at top of planning statement.

5. Is there monitoring or other conditions that Planning/Assessment needs in the permit?

   There is a completed downstream TMDL for the aquatic life use impairment for the Chesapeake Bay. However, the Bay TMDL and the WLAs contained within the TMDL are not addressed in this planning statement.

6. Fact Sheet Requirements – Please provide information regarding any drinking water intakes located within a 5 mile radius of the discharge point.

   There are no public water supply intakes within a 5 mile radius of this facility's proposed outfall location.

Section III – Outfall 003; Proposed Receiving Waters: South Anna River (upstream of Rock Creek)

1. Please provide water quality monitoring information for the receiving stream segment. If there is not monitoring information for the receiving stream segment, please provide information on the nearest downstream monitoring station, including how far downstream the monitoring station is from the outfall.

   The proposed outfall would discharge into a segment of the South Anna River that is monitored and assessed. The DEQ monitoring station, 8-SAR089.35 is located 2.9 miles upstream of the proposed discharge location, at the Route 613 bridge crossing. The following is the water quality summary for this segment of the South Anna River, as taken from the Draft 2012 Integrated Report*:

   Class III, Section 3.

   DEQ ambient monitoring station 8-SAR089.35, at Route 613. Citizen Monitoring Station 8SAR-F02-HGSI.

   E. coli monitoring finds a bacterial impairment, resulting in an impaired classification for the recreation use. This impairment is nested within the downstream completed bacteria TMDL for the South Anna River. The aquatic life use is considered fully supporting. The fish consumption use was not assessed.

   The wildlife use information from the 2010 assessment is as follows:
   The wildlife use is considered fully supporting.

   The nearest downstream DEQ monitoring station from the proposed discharge location is 8-SAR076.10, located in the Route 604 bridge crossing, approximately 9.2 miles downstream of the proposed outfall.

   **The Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently being finalized and prepared for release.*

2. Does this facility discharge to a stream segment on the 303(d) list? If yes, please fill out Table A.

   Yes.

Table A: Impairment and TMDL information for the receiving stream segment

Waterbody Name	Impaired Use	Cause	Distance From Outfall	TMDL completed	WLA	Basis for WLA	TMDL Schedule
Impairment Information in the Draft 2012 Integrated Report*							
South Anna River	Recreation	*E. coli*	0.0 miles	Pamunkey River Bacteria 08/02/2006	1.22E+12 cfu/year *E. coli*	126 cfu/100ml --- 0.7 MGD	N/A

**The Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently being finalized and prepared for release.*

3. Are there any downstream 303(d) listed impairments that are relevant to this discharge? If yes, please fill out Table B.

   No.

4. Could you please calculate the drainage area for the outfall?

   See text box at top of planning statement.

5. Is there monitoring or other conditions that Planning/Assessment needs in the permit?

   There is a completed downstream TMDL for the aquatic life use impairment for the Chesapeake Bay. However, the Bay TMDL and the WLAs contained within the TMDL are not addressed in this planning statement.

6. Fact Sheet Requirements – Please provide information regarding any drinking water intakes located within a 5 mile radius of the discharge point.

   There are no public water supply intakes within a 5 mile radius of this facility's proposed outfall location.

Section IV – Outfall 004; Proposed Receiving Waters: South Anna River (near Route 208)

1. Please provide water quality monitoring information for the receiving stream segment. If there is not monitoring information for the receiving stream segment, please provide information on the nearest downstream monitoring station, including how far downstream the monitoring station is from the outfall.

   The proposed outfall would discharge into a segment of the South Anna River that is not monitored and assessed. The nearest downstream DEQ monitoring station on the South Anna River is Station 8-SAR076.10, located at the Route 604 bridge crossing, approximately 4.3 miles downstream of the

proposed discharge location. The following is the water quality summary for this segment of the South Anna River, as taken from the Draft 2012 Integrated Report*:

Class III, Section 3.

DEQ ambient monitoring station 8-SAR070.96, at Route 646, and 8-SAR076.10, at Route 604. Citizen monitoring station 8SAR-F02C-HGSI.

E. coli monitoring finds a bacterial impairment, resulting in an impaired classification for the recreation use. A bacteria TMDL for the South Anna River watershed has been completed and approved. The aquatic life and wildlife uses are considered fully supporting. The fish consumption use was not assessed.

**The Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently being finalized and prepared for release.*

2. Does this facility discharge to a stream segment on the 303(d) list? If yes, please fill out Table A.

   No.

3. Are there any downstream 303(d) listed impairments that are relevant to this discharge? If yes, please fill out Table B.

   Yes.

Table B: Information on Downstream 303(d) Impairments and TMDLs

Waterbody Name	Impaired Use	Cause	Distance From Outfall	TMDL completed	WLA	Basis for * WLA	TMDL Schedule
Impairment Information in the Draft 2012 Integrated Report*							
South Anna River	Recreation	*E. coli*	4.3 miles	Pamunkey River Bacteria 08/02/2006	1.22E+12 cfu/year *E. coli*	126 cfu/100ml --- 0.7 MGD	N/A

**The Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently being finalized and prepared for release.*

4. Could you please calculate the drainage area for the outfall?

   See text box at top of planning statement.

5. Is there monitoring or other conditions that Planning/Assessment needs in the permit?

   There is a completed downstream TMDL for the aquatic life use impairment for the Chesapeake Bay. However, the Bay TMDL and the WLAs contained within the TMDL are not addressed in this planning statement.

6. Fact Sheet Requirements – Please provide information regarding any drinking water intakes located within a 5 mile radius of the discharge point.

   There are no public water supply intakes within a 5 mile radius of this facility's proposed outfall location.

Section V – Upstream Water Quality: South Anna River

Upstream of the proposed outfall location for Zion Crossroads, there are several stream segments of the South Anna River that are listed in the Draft 2012 Integrated Assessment as impaired:

A. The 7.55 mile stretch of the South Anna River, beginning at the confluence with Dove Fork and extending down to the confluence with Wheeler Creek, is listed as not supporting the recreation use due to exceedances of the instantaneous fecal coliform bacteria criterion (5 of 19 samples – 57.1%) recorded at DEQ's ambient water quality monitoring station (8-SAR096.83) at the Route 15 bridge. The bacteria impairment was first listed in 2006. The downstream extent of the impaired area is 2.69 miles upstream of the proposed discharge location.

B. The 1.83 mile stretch of the South Anna River that begins at the confluence with an unnamed tributary located approximately 1 mile downstream of the Route 860 bridge and extends down to the confluence with Dove Fork is listed as not supporting the recreation use and the aquatic life use. The downstream extent of the impaired area is 10.24 miles upstream of the proposed discharge location.
   a. Sufficient excursions from the maximum *E. coli* bacteria criterion (11 of 24 samples - 45.8%) were recorded at DEQ's ambient water quality monitoring station (8-SAR097.82) at the Route 603 crossing to assess this stream segment as not supporting the recreation use for the 2012 water quality assessment. The segment was previously listed for a fecal coliform bacteria impairment from 2002 through 2004. The *E. coli* bacteria impairment was first listed in 2006.
   b. The benthic macroinvertebrate community was determined to be impaired based on 8 biological monitoring events at station 8-SAR097.82 in 2005, 2006, 2007 and 2008. The benthic impairment was first listed in 2010.

C. The 5.12 mile stretch of the South Anna River, beginning at its headwaters and continuing downstream until the confluence with an unnamed tributary approximately 1.0 mile downstream of Route 860, is listed as not supporting the recreation use due to exceedances of the maximum *E. coli* bacteria criterion (6 of 14 samples - 42.9%) recorded at DEQ's ambient water quality monitoring station (8-SAR101.03) at the Route 231 crossing. This segment was previously listed for a fecal coliform bacteria impairment from 2002 through 2004. The *E. coli* bacteria impairment was first listed in 2006. The downstream extent of the impaired area is 12.07 miles upstream of the proposed discharge location.

Zion Crossroads WWTP (VA0090743)
pH/Temperature Data
Jan 2011--Mar 2012

Month	Day	pH	Temp
Jan-11	1	7.7	13.7
	2	7.7	15.3
	3	7.8	13.1
	4	7.8	12.4
	5	7.9	12.1
	6	8.0	11.7
	7	7.8	12.0
	8	7.8	12.3
	9	7.9	10.4
	10	7.8	11.1
	11	7.9	10.5
	12	8.0	10.0
	13	8.1	10.5
	14	8.1	10.2
	15	8.1	11.4
	16	8.0	12.2
	17	8.0	12.4
	18	8.0	11.7
	19	7.9	12.5
	20	8.0	12.0
	21	8.0	12.2
	22	8.0	10.4
	23	8.1	9.7
	24	8.1	9.7
	25	8.0	10.8
	26	8.1	10.9
	27	8.0	11.4
	28	8.1	11.5
	29	8.1	11.0
	30	7.9	11.6
	31	8.0	12.1
Feb-11	1	8.0	11.8
	2	7.9	12.7
	3	7.9	11.5
	4	8.1	11.1
	5	8.1	11.9
	6	7.9	11.9
	7	8.0	11.5
	8	8.1	11.4
	9	8.1	10.0
	10	8.0	11.1
	11	8.1	10.0

Attachment 7

	12	8.1	10.7
	13	8.0	11.6
	14	8.0	12.6
	15	8.0	11.8
	16	8.0	11.0
	17	8.0	12.6
	18	8.1	14.1
	19	8.0	12.9
	20	8.0	12.1
	21	8.1	13.1
	22	7.8	12.7
	23	8.1	13.6
	24	8.0	11.5
	25	8.1	13.6
	26	8.2	12.1
	27	8.0	13.0
	28	8.1	14.2
Mar-11	1	8.0	12.7
	2	8.0	11.9
	3	8.0	12.0
	4	8.0	11.4
	5	8.0	13.0
	6	8.1	14.5
	7	7.5	12.6
	8	7.8	11.9
	9	8.0	12.0
	10	7.7	14.2
	11	7.8	12.8
	12	7.8	12.4
	13	7.9	12.8
	14	8.0	12.7
	15	8.0	12.8
	16	8.0	13.4
	17	8.0	13.0
	18	7.9	13.8
	19	7.9	14.8
	20	7.9	13.3
	21	8.0	14.0
	22	8.0	15.1
	23	7.9	13.9
	24	7.9	14.7
	25	7.9	13.3
	26	7.8	13.3
	27	7.9	12.9
	28	7.9	13.0

Zion Crossroads WWTP (VA0090743)
pH/Temperature Data
Jan 2011--Mar 2012

	29	7.8	12.5
	30	8.0	13.3
	31	7.9	12.9
Apr-11	1	7.9	13.6
	2	7.9	13.2
	3	7.8	13.3
	4	7.9	14.1
	5	7.8	15.9
	6	7.8	13.4
	7	7.9	14.8
	8	7.8	14.8
	9	7.7	14.4
	10	7.9	14.7
	11	7.7	16.6
	12	7.8	16.9
	13	7.7	16.1
	14	7.8	14.7
	15	7.9	14.7
	16	7.7	15.6
	17	7.6	15.1
	18	7.7	15.6
	19	7.7	16.2
	20	7.8	16.5
	21	7.9	16.6
	22	7.9	15.2
	23	7.6	15.4
	24	7.7	16.8
	25	7.7	17.3
	26	7.9	18.2
	27	7.9	18.6
	28	7.8	19.1
	29	7.8	18.6
	30	7.8	15.9
May-11	1	7.7	16.4
	2	7.8	17.1
	3	7.8	17.8
	4	7.7	17.4
	5	7.8	15.9
	6	7.8	15.9
	7	7.7	16.2
	8	7.7	16.9
	9	7.8	17.0
	10	7.8	16.9
	11	7.8	17.7
	12	7.7	17.8

	13	7.8	18.1
	14	7.8	18.2
	15	7.7	18.4
	16	7.8	18.5
	17	7.6	18.3
	18	7.4	17.6
	19	7.7	17.1
	20	7.7	17.3
	21	7.7	17.5
	22	7.7	18.1
	23	7.7	19.1
	24	7.7	19.6
	25	8.0	20.0
	26	7.9	20.8
	27	7.8	19.6
	28	7.8	19.5
	29	7.9	19.9
	30	7.7	20.4
	31	7.8	20.5
Jun-11	1	7.9	21.6
	2	7.9	20.9
	3	7.9	19.1
	4	7.8	18.6
	5	7.8	20.0
	6	7.8	20.2
	7	8.0	20.5
	8	7.9	20.9
	9	7.8	20.9
	10	7.8	20.6
	11	7.9	20.8
	12	7.8	20.8
	13	7.8	20.7
	14	8.0	20.5
	15	8.1	20.0
	16	8.0	20.5
	17	8.0	20.8
	18	7.9	21.1
	19	7.7	21.0
	20	7.6	21.1
	21	7.9	21.8
	22	7.6	21.8
	23	7.9	21.6
	24	7.9	21.6
	25	7.7	20.7

Zion Crossroads WWTP (VA0090743)
pH/Temperature Data
Jan 2011--Mar 2012

	26	7.8	21.1
	27	7.9	21.5
	28	8.1	22.3
	29	8.0	22.3
	30	7.8	21.2
Jul-11	1	7.7	20.8
	2	7.8	21.9
	3	7.7	21.8
	4	7.7	22.7
	5	7.8	22.0
	6	7.7	22.9
	7	7.7	22.8
	8	7.8	21.9
	9	7.7	22.1
	10	7.7	22.3
	11	7.8	21.8
	12	7.8	22.5
	13	7.7	22.7
	14	7.7	22.1
	15	7.7	21.3
	16	7.8	21.3
	17	7.7	21.1
	18	7.8	21.9
	19	7.6	22.7
	20	7.0	22.7
	21	7.7	23.1
	22	7.8	23.3
	23	7.8	23.5
	24	7.9	23.6
	25	7.9	23.6
	26	7.9	23.9
	27	7.9	23.7
	28	7.9	24.0
	29	8.0	23.8
	30	7.8	23.5
	31	7.8	23.5
Aug-11	1	7.8	23.9
	2	8.0	23.8
	3	7.9	24.0
	4	7.9	23.8
	5	7.8	23.9
	6	7.8	23.3
	7	7.8	23.6
	8	7.8	23.7
	9	7.8	23.8

	10	7.9	23.4
	11	7.9	22.8
	12	7.9	23.0
	13	7.9	23.4
	14	7.9	23.7
	15	7.7	23.1
	16	7.2	22.2
	17	8.0	23.0
	18	7.9	23.3
	19	7.9	23.2
	20	7.8	22.6
	21	7.9	23.2
	22	7.8	23.6
	23	7.9	22.3
	24	7.9	22.3
	25	7.9	23.4
	26	7.7	23.3
	27	7.8	23.6
	28	7.6	22.8
	29	7.7	22.6
	30	7.8	22.6
	31	7.9	22.3
Sep-11	1	7.9	22.7
	2	7.9	22.9
	3	7.8	23.0
	4	7.8	23.1
	5	7.9	23.4
	6	7.6	22.4
	7	7.2	22.1
	8	8.0	22.4
	9	8.0	23.1
	10	7.8	22.5
	11	7.9	22.2
	12	7.9	22.8
	13	7.9	22.4
	14	7.9	22.6
	15	8.0	22.7
	16	8.0	20.4
	17	7.9	21.1
	18	7.9	20.8
	19	7.9	21.8
	20	8.0	22.1
	21	8.0	22.1
	22	7.9	22.9
	23	8.0	22.6

	24	7.7	22.0
	25	8.1	22.1
	26	7.9	22.7
	27	7.8	23.2
	28	7.9	22.7
	29	7.9	22.3
	30	7.9	21.4
Oct-11	1	7.9	20.7
	2	7.9	20.1
	3	7.9	20.1
	4	7.9	20.1
	5	8.1	19.9
	6	8.0	20.3
	7	7.9	20.0
	8	7.9	20.1
	9	8.0	19.3
	10	7.8	20.3
	11	7.9	21.2
	12	7.9	21.6
	13	7.7	21.4
	14	7.8	21.2
	15	7.9	19.5
	16	7.7	19.6
	17	8.1	20.1
	18	8.0	20.3
	19	7.9	21.1
	20	7.7	20.3
	21	7.8	19.1
	22	7.9	18.8
	23	7.8	18.6
	24	7.9	18.9
	25	8.0	18.3
	26	8.0	18.4
	27	7.8	19.1
	28	7.6	18.7
	29	8.0	15.8
	30	7.8	16.5
	31	7.8	16.7
Nov-11	1	7.7	17.1
	2	8.1	15.4
	3	7.6	17.1
	4	8.1	16.8
	5	7.8	16.6
	6	7.9	15.7
	7	7.9	15.6

	8	7.5	16.0
	9	7.5	16.0
	10	7.7	16.4
	11	7.7	15.8
	12	7.9	14.9
	13	7.6	16.1
	14	7.9	16.6
	15	7.9	17.8
	16	8.0	18.1
	17	8.0	17.6
	18	8.0	15.7
	19	7.6	15.4
	20	7.8	15.7
	21	7.7	17.3
	22	8.0	17.4
	23	7.9	18.0
	24	7.8	16.3
	25	7.6	16.1
	26	7.7	15.8
	27	7.6	16.3
	28	7.8	17.0
	29	7.6	18.2
	30	7.7	16.5
Dec-11	1	7.7	15.2
	2	7.8	14.6
	3	7.8	14.4
	4	7.9	14.3
	5	7.7	15.2
	6	7.7	16.8
	7	7.7	17.8
	8	7.6	16.0
	9	7.5	15.0
	10	7.7	14.4
	11	7.7	13.6
	12	7.6	13.0
	13	7.6	13.5
	14	7.7	14.4
	15	7.7	14.7
	16	7.7	15.5
	17	7.7	14.4
	18	7.7	14.1
	19	7.5	14.1
	20	7.6	14.9
	21	7.6	15.5
	22	7.7	15.9

	23	7.8	15.9
	24	7.6	15.4
	25	7.6	14.6
	26	7.6	14.5
	27	7.6	14.4
	28	7.6	14.2
	29	7.7	13.5
	30	7.6	13.9
	31	7.7	14.7
Jan-12	1	7.7	13.9
	2	7.6	14.3
	3	7.7	13.6
	4	7.7	12.4
	5	7.5	13.1
	6	7.6	13.0
	7	7.6	13.2
	8	7.8	12.8
	9	7.7	13.5
	10	7.5	13.9
	11	7.5	13.7
	12	7.6	14.3
	13	7.7	13.3
	14	7.8	12.8
	15	7.8	12.4
	16	7.6	12.3
	17	7.6	13.2
	18	7.6	13.4
	19	7.6	12.4
	20	7.9	12.2
	21	7.8	11.9
	22	7.5	12.5
	23	7.7	12.9
	24	7.7	13.5
	25	7.7	13.0
	26	7.5	13.7
	27	7.5	15.2
	28	7.7	13.4
	29	7.7	12.8
	30	7.7	12.3
	31	7.7	13.1
Feb-12	1	7.7	13.9
	2	7.7	14.8
	3	7.7	13.6
	4	7.7	13.3
	5	7.7	13.4

	6	7.6	13.0
	7	7.5	13.1
	8	7.5	13.2
	9	7.6	12.9
	10	7.7	12.6
	11	7.8	13.0
	12	7.8	11.6
	13	7.5	11.6
	14	7.5	12.2
	15	7.5	12.7
	16	7.6	13.2
	17	7.6	13.3
	18	7.8	12.7
	19	7.7	13.0
	20	7.8	12.3
	21	7.5	11.5
	22	8.0	11.8
	23	7.8	12.9
	24	7.9	13.8
	25	7.8	13.0
	26	7.8	12.3
	27	7.6	12.5
	28	7.5	13.0
	29	7.4	13.2
Mar-12	1	7.6	14.1
	2	7.4	13.5
	3	7.6	13.5
	4	7.6	13.2
	5	8.0	12.3
	6	7.7	11.5
	7	7.6	12.3
	8	7.7	13.7
	9	7.7	14.6
	10	7.6	13.3
	11	7.9	12.4
	12	7.9	12.8
	13	7.6	14.8
	14	7.6	15.0
	15	7.6	15.3
	16	7.7	15.6
	17	7.8	15.4
	18	7.7	15.8
	19	7.5	16.4
	20	7.8	16.7
	21	7.6	17.4

Zion Crossroads WWTP (VA0090743)
pH/Temperature Data
Jan 2011--Mar 2012

	22	7.8	17.1
	23	7.6	17.5
	24	7.7	17.9
	25	7.7	17.2
	26	7.8	16.8
	27	7.7	15.4
	28	7.6	15.1
	29	7.9	15.7
	30	7.8	15.3
	31	7.7	15.9
90th Percentile		**8**	**22.7**
10th Percentile		**7.6**	

pH and Temperature Data Monitoring Station 8-SAR089.35
Oct 2002 -- Mar 2012

Collection Date	Temp (C)	pH (SU)
23-Oct-02	12.4	7.0
24-Mar-03	12.3	6.7
8-Apr-03	9.2	6.9
13-May-03	17.6	6.9
21-Aug-03	25.2	6.6
14-Oct-03	16.2	6.9
11-Dec-03	7.1	6.2
24-Feb-04	5.7	7.2
7-Jun-04	19.6	7.3
18-Aug-04	22.8	7.4
13-Oct-04	12.4	7.0
28-Dec-04	0.4	7.0
10-Mar-05	5.1	6.9
18-Jul-05	27.4	6.9
29-Sep-05	18.7	6.8
29-Nov-05	10.8	6.9
12-Mar-07	9.3	7.4
23-May-07	19.8	7.1
23-Jul-07	21.6	7.2
10-Sep-07	23.9	7.0
19-Nov-07	8.0	7.4
14-Jan-08	4.1	7.3
24-Mar-08	9.6	7.4
19-May-08	15.9	7.0
31-Jul-08	25.4	7.0
11-Sep-08	20.3	7.0
3-Nov-08	10.3	7.5
7-Jan-09	3.8	7.0
30-Mar-09	12.9	7.3
18-May-09	16.9	6.8
29-Jul-09	25.0	7.0
17-Sep-09	19.8	7.0
3-Nov-09	12.1	7.1
5-Jan-10	1.2	6.9
18-Mar-10	9.6	6.9
28-Apr-10	14.4	7.2
29-Jun-10	26.5	7.0
7-Sep-10	21.2	7.0
20-Jan-11	2.8	7.3
22-Mar-11	14.0	7.0
17-May-11	17.2	6.7
5-Jul-11	24.7	7.0
1-Sep-11	21.4	6.7
3-Nov-11	9.4	7.0
31-Jan-12	5.4	7.0
19-Mar-12	15.9	7.3
90th Percentile	**24.5**	**7.4**
10th Percentile	**4.5**	**6.8**

Attachment 8

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Zion Crossroads WWTP

Permit No.: VA0090743

Receiving Stream: Camp Creek Impoundment

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =		mg/L
90% Temperature (Annual) =		deg C
90% Temperature (Wet season) =		deg C
90% Maximum pH =		SU
10% Maximum pH =		SU
Tier Designation (1 or 2) =	2	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	0	MGD
7Q10 (Annual) =	0	MGD
30Q10 (Annual) =	0	MGD
1Q10 (Wet season) =	0	MGD
30Q10 (Wet season)	0	MGD
30Q5 =	0	MGD
Harmonic Mean =	0	MGD

Mixing Information

Annual - 1Q10 Mix =	0	%
- 7Q10 Mix =	0	%
- 30Q10 Mix =	0	%
Wet Season - 1Q10 Mix =	0	%
- 30Q10 Mix =	0	%

Effluent Information

Mean Hardness (as CaCO3) =	201	mg/L
90% Temp (Annual) =	23	deg C
90% Temp (Wet season) =	15	deg C
90% Maximum pH =	8	SU
10% Maximum pH =	7.6	SU
Discharge Flow =	0.311	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	9.9E+02	--	--	na	9.9E+02	--	--	na	9.9E+01	--	--	na	9.9E+01	--	--	**na**	**9.9E+01**
Acrolein	0	--	--	na	9.3E+00	--	--	na	9.3E+00	--	--	na	9.3E-01	--	--	na	9.3E-01	--	--	**na**	**9.3E-01**
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	2.5E+00	--	--	na	2.5E-01	--	--	na	2.5E-01	--	--	**na**	**2.5E-01**
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	3.0E+00	--	na	5.0E-04	7.5E-01	--	na	5.0E-05	7.5E-01	--	na	5.0E-05	**7.5E-01**	--	**na**	**5.0E-05**
Ammonia-N (mg/l) (Yearly)	0	8.41E+00	1.41E+00	na	--	8.41E+00	1.41E+00	na	--	2.10E+00	3.52E-01	na	--	2.10E+00	3.52E-01	na	--	**2.10E+00**	**3.52E-01**	**na**	--
Ammonia-N (mg/l) (High Flow)	0	8.41E+00	2.36E+00	na	--	8.41E+00	2.36E+00	na	--	2.10E+00	5.90E-01	na	--	2.10E+00	5.90E-01	na	--	**2.10E+00**	**5.90E-01**	**na**	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	4.0E+04	--	--	na	4.0E+03	--	--	na	4.0E+03	--	--	**na**	**4.0E+03**
Antimony	0	--	--	na	6.4E+02	--	--	na	6.4E+02	--	--	na	6.4E+01	--	--	na	6.4E+01	--	--	**na**	**6.4E+01**
Arsenic	0	3.4E+02	1.5E+02	na	--	3.4E+02	1.5E+02	na	--	8.5E+01	3.8E+01	na	--	8.5E+01	3.8E+01	na	--	**8.5E+01**	**3.8E+01**	**na**	--
Barium	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	**na**	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	5.1E+02	--	--	na	5.1E+01	--	--	na	5.1E+01	--	--	**na**	**5.1E+01**
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	2.0E-03	--	--	na	2.0E-04	--	--	na	2.0E-04	--	--	**na**	**2.0E-04**
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	**na**	**1.8E-02**
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	**na**	**1.8E-02**
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	**na**	**1.8E-02**
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	**na**	**1.8E-02**
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	5.3E+00	--	--	na	5.3E-01	--	--	na	5.3E-01	--	--	**na**	**5.3E-01**
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	6.5E+04	--	--	na	6.5E+03	--	--	na	6.5E+03	--	--	**na**	**6.5E+03**
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	2.2E+01	--	--	na	2.2E+00	--	--	na	2.2E+00	--	--	**na**	**2.2E+00**
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	1.4E+03	--	--	na	1.4E+02	--	--	na	1.4E+02	--	--	**na**	**1.4E+02**
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	1.9E+03	--	--	na	1.9E+02	--	--	na	1.9E+02	--	--	**na**	**1.9E+02**
Cadmium	0	8.6E+00	2.0E+00	na	--	8.6E+00	2.0E+00	na	--	2.2E+00	4.9E-01	na	--	2.2E+00	4.9E-01	na	--	**2.2E+00**	**4.9E-01**	**na**	--
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	1.6E+01	--	--	na	1.6E+00	--	--	na	1.6E+00	--	--	**na**	**1.6E+00**
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	2.4E+00	4.3E-03	na	8.1E-03	6.0E-01	1.1E-03	na	8.1E-04	6.0E-01	1.1E-03	na	8.1E-04	**6.0E-01**	**1.1E-03**	**na**	**8.1E-04**
Chloride	0	8.6E+05	2.3E+05	na	--	8.6E+05	2.3E+05	na	--	2.2E+05	5.8E+04	na	--	2.2E+05	5.8E+04	na	--	**2.2E+05**	**5.8E+04**	**na**	--
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.1E+01	na	--	4.8E+00	2.8E+00	na	--	4.8E+00	2.8E+00	na	--	**4.8E+00**	**2.8E+00**	**na**	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	1.6E+03	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	**na**	**1.6E+02**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	1.3E+02	--	--	na	1.3E+01	--	--	na	1.3E+01	--	--	na	1.3E+01
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.1E+04	--	--	na	1.1E+03	--	--	na	1.1E+03	--	--	na	1.1E+03
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	1.6E+03	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	na	1.6E+02
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	na	1.5E+01	--	--	na	1.5E+01	--	--	na	1.5E+01
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.3E-02	4.1E-02	na	--	2.1E-02	1.0E-02	na	--	2.1E-02	1.0E-02	na	--	2.1E-02	1.0E-02	na	--
Chromium III	0	1.0E+03	1.3E+02	na	--	1.0E+03	1.3E+02	na	--	2.5E+02	3.3E+01	na	--	2.5E+02	3.3E+01	na	--	2.5E+02	3.3E+01	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	4.0E+00	2.8E+00	na	--	4.0E+00	2.8E+00	na	--	4.0E+00	2.8E+00	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	1.0E+01	--	--	--	1.0E+01	--	--	--	na	--
Chrysene [C]	0	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	na	1.8E-03	--	--	na	1.8E-03	--	--	na	1.8E-03
Copper	0	2.6E+01	1.6E+01	na	--	2.6E+01	1.6E+01	na	--	6.5E+00	4.1E+00	na	--	6.5E+00	4.1E+00	na	--	6.5E+00	4.1E+00	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.2E+01	5.2E+00	na	1.6E+04	5.5E+00	1.3E+00	na	1.6E+03	5.5E+00	1.3E+00	na	1.6E+03	5.5E+00	1.3E+00	na	1.6E+03
DDD [C]	0	--	--	na	3.1E-03	--	--	na	3.1E-03	--	--	na	3.1E-04	--	--	na	3.1E-04	--	--	na	3.1E-04
DDE [C]	0	--	--	na	2.2E-03	--	--	na	2.2E-03	--	--	na	2.2E-04	--	--	na	2.2E-04	--	--	na	2.2E-04
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.1E+00	1.0E-03	na	2.2E-03	2.8E-01	2.5E-04	na	2.2E-04	2.8E-01	2.5E-04	na	2.2E-04	2.8E-01	2.5E-04	na	2.2E-04
Demeton	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	2.5E-02	na	--	--	2.5E-02	na	--	--	2.5E-02	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.7E-01	1.7E-01	na	--	4.3E-02	4.3E-02	na	--	4.3E-02	4.3E-02	na	--	4.3E-02	4.3E-02	na	--
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	na	1.8E-02
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	1.3E+03	--	--	na	1.3E+02	--	--	na	1.3E+02	--	--	na	1.3E+02
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	9.6E+02	--	--	na	9.6E+01	--	--	na	9.6E+01	--	--	na	9.6E+01
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	1.9E+02	--	--	na	1.9E+01	--	--	na	1.9E+01	--	--	na	1.9E+01
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	2.8E-01	--	--	na	2.8E-02	--	--	na	2.8E-02	--	--	na	2.8E-02
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	1.7E+02	--	--	na	1.7E+01	--	--	na	1.7E+01	--	--	na	1.7E+01
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	na	3.7E+01	--	--	na	3.7E+01	--	--	na	3.7E+01
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	7.1E+03	--	--	na	7.1E+02	--	--	na	7.1E+02	--	--	na	7.1E+02
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.0E+04	--	--	na	1.0E+03	--	--	na	1.0E+03	--	--	na	1.0E+03
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	2.9E+02	--	--	na	2.9E+01	--	--	na	2.9E+01	--	--	na	2.9E+01
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	na	1.5E+01	--	--	na	1.5E+01	--	--	na	1.5E+01
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	2.1E+02	--	--	na	2.1E+01	--	--	na	2.1E+01	--	--	na	2.1E+01
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	2.4E-01	5.6E-02	na	5.4E-04	6.0E-02	1.4E-02	na	5.4E-05	6.0E-02	1.4E-02	na	5.4E-05	6.0E-02	1.4E-02	na	5.4E-05
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	4.4E+04	--	--	na	4.4E+03	--	--	na	4.4E+03	--	--	na	4.4E+03
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	8.5E+02	--	--	na	8.5E+01	--	--	na	8.5E+01	--	--	na	8.5E+01
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.1E+06	--	--	na	1.1E+05	--	--	na	1.1E+05	--	--	na	1.1E+05
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	4.5E+03	--	--	na	4.5E+02	--	--	na	4.5E+02	--	--	na	4.5E+02
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	5.3E+03	--	--	na	5.3E+02	--	--	na	5.3E+02	--	--	na	5.3E+02
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	2.8E+02	--	--	na	2.8E+01	--	--	na	2.8E+01	--	--	na	2.8E+01
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	3.4E+01	--	--	na	3.4E+00	--	--	na	3.4E+00	--	--	na	3.4E+00
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	5.1E-08	--	--	na	5.1E-09	--	--	na	5.1E-09	--	--	na	5.1E-09
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	2.0E+00	--	--	na	2.0E-01	--	--	na	2.0E-01	--	--	na	2.0E-01
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	8.9E+01	5.5E-02	1.4E-02	na	8.9E+00	5.5E-02	1.4E-02	na	8.9E+00	5.5E-02	1.4E-02	na	8.9E+00
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	8.9E+01	5.5E-02	1.4E-02	na	8.9E+00	5.5E-02	1.4E-02	na	8.9E+00	5.5E-02	1.4E-02	na	8.9E+00
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.2E-01	5.6E-02	--	--	5.5E-02	1.4E-02	--	--	5.5E-02	1.4E-02	--	--	5.5E-02	1.4E-02	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	8.9E+01	--	--	na	8.9E+00	--	--	na	8.9E+00	--	--	na	8.9E+00
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	8.6E-02	3.6E-02	na	6.0E-02	2.2E-02	9.0E-03	na	6.0E-03	2.2E-02	9.0E-03	na	6.0E-03	2.2E-02	9.0E-03	na	6.0E-03
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	3.0E-01	--	--	na	3.0E-02	--	--	na	3.0E-02	--	--	na	3.0E-02

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	2.1E+03	--	--	na	2.1E+02	--	--	na	2.1E+02	--	--	na	**2.1E+02**
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	1.4E+02	--	--	na	1.4E+01	--	--	na	1.4E+01	--	--	na	**1.4E+01**
Fluorene	0	--	--	na	5.3E+03	--	--	na	5.3E+03	--	--	na	5.3E+02	--	--	na	5.3E+02	--	--	na	**5.3E+02**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.0E-02	na	--	--	2.5E-03	na	--	--	2.5E-03	na	--	--	**2.5E-03**	na	--
Heptachlor [C]	0	5.2E-01	3.8E-03	na	7.9E-04	5.2E-01	3.8E-03	na	7.9E-04	1.3E-01	9.5E-04	na	7.9E-05	1.3E-01	9.5E-04	na	7.9E-05	**1.3E-01**	**9.5E-04**	na	**7.9E-05**
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	3.9E-04	5.2E-01	3.8E-03	na	3.9E-04	1.3E-01	9.5E-04	na	3.9E-05	1.3E-01	9.5E-04	na	3.9E-05	**1.3E-01**	**9.5E-04**	na	**3.9E-05**
Hexachlorobenzene[C]	0	--	--	na	2.9E-03	--	--	na	2.9E-03	--	--	na	2.9E-04	--	--	na	2.9E-04	--	--	na	**2.9E-04**
Hexachlorobutadiene[C]	0	--	--	na	1.8E+02	--	--	na	1.8E+02	--	--	na	1.8E+01	--	--	na	1.8E+01	--	--	na	**1.8E+01**
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	4.9E-02	--	--	na	4.9E-02	--	--	na	4.9E-03	--	--	na	4.9E-03	--	--	na	**4.9E-03**
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	1.7E-01	--	--	na	1.7E-01	--	--	na	1.7E-02	--	--	na	1.7E-02	--	--	na	**1.7E-02**
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	1.8E+00	9.5E-01	--	na	1.8E+00	2.4E-01	--	na	1.8E-01	2.4E-01	--	na	1.8E-01	**2.4E-01**	--	na	**1.8E-01**
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.1E+03	--	--	na	1.1E+02	--	--	na	1.1E+02	--	--	na	**1.1E+02**
Hexachloroethane[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	na	3.3E+00	--	--	na	3.3E+00	--	--	na	**3.3E+00**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+00	na	--	--	5.0E-01	na	--	--	5.0E-01	na	--	--	**5.0E-01**	na	--
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	na	**1.8E-02**
Iron	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Isophorone[C]	0	--	--	na	9.6E+03	--	--	na	9.6E+03	--	--	na	9.6E+02	--	--	na	9.6E+02	--	--	na	**9.6E+02**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	**0.0E+00**	na	--
Lead	0	2.9E+02	3.3E+01	na	--	2.9E+02	3.3E+01	na	--	7.2E+01	8.2E+00	na	--	7.2E+01	8.2E+00	na	--	**7.2E+01**	**8.2E+00**	na	--
Malathion	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	2.5E-02	na	--	--	2.5E-02	na	--	--	**2.5E-02**	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.4E+00	7.7E-01	--	--	3.5E-01	1.9E-01	--	--	3.5E-01	1.9E-01	--	--	**3.5E-01**	**1.9E-01**	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	1.5E+03	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	na	**1.5E+02**
Methylene Chloride [C]	0	--	--	na	5.9E+03	--	--	na	5.9E+03	--	--	na	5.9E+02	--	--	na	5.9E+02	--	--	na	**5.9E+02**
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E-02	na	--	--	7.5E-03	na	--	--	7.5E-03	na	--	--	**7.5E-03**	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	0.0E+00	na	--	--	**0.0E+00**	na	--
Nickel	0	3.3E+02	3.7E+01	na	4.6E+03	3.3E+02	3.7E+01	na	4.6E+03	8.2E+01	9.1E+00	na	4.6E+02	8.2E+01	9.1E+00	na	4.6E+02	**8.2E+01**	**9.1E+00**	na	**4.6E+02**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	6.9E+02	--	--	na	6.9E+01	--	--	na	6.9E+01	--	--	na	**6.9E+01**
N-Nitrosodimethylamine[C]	0	--	--	na	3.0E+01	--	--	na	3.0E+01	--	--	na	3.0E+00	--	--	na	3.0E+00	--	--	na	**3.0E+00**
N-Nitrosodiphenylamine[C]	0	--	--	na	6.0E+01	--	--	na	6.0E+01	--	--	na	6.0E+00	--	--	na	6.0E+00	--	--	na	**6.0E+00**
N-Nitrosodi-n-propylamine[C]	0	--	--	na	5.1E+00	--	--	na	5.1E+00	--	--	na	5.1E-01	--	--	na	5.1E-01	--	--	na	**5.1E-01**
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.8E+01	6.6E+00	na	--	7.0E+00	1.7E+00	--	--	7.0E+00	1.7E+00	--	--	**7.0E+00**	**1.7E+00**	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	6.5E-02	1.3E-02	na	--	1.6E-02	3.3E-03	na	--	1.6E-02	3.3E-03	na	--	**1.6E-02**	**3.3E-03**	na	--
PCB Total[C]	0	--	1.4E-02	na	6.4E-04	--	1.4E-02	na	6.4E-04	--	3.5E-03	na	6.4E-05	--	3.5E-03	na	6.4E-05	--	**3.5E-03**	na	**6.4E-05**
Pentachlorophenol [C]	0	1.6E+01	1.2E+01	na	3.0E+01	1.6E+01	1.2E+01	na	3.0E+01	4.0E+00	3.1E+00	na	3.0E+00	4.0E+00	3.1E+00	na	3.0E+00	**4.0E+00**	**3.1E+00**	na	**3.0E+00**
Phenol	0	--	--	na	8.6E+05	--	--	na	8.6E+05	--	--	na	8.6E+04	--	--	na	8.6E+04	--	--	na	**8.6E+04**
Pyrene	0	--	--	na	4.0E+03	--	--	na	4.0E+03	--	--	na	4.0E+02	--	--	na	4.0E+02	--	--	na	**4.0E+02**
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.0E+01	5.0E+00	na	4.2E+03	5.0E+00	1.3E+00	na	4.2E+02	5.0E+00	1.3E+00	na	4.2E+02	**5.0E+00**	**1.3E+00**	**na**	**4.2E+02**
Silver	0	1.1E+01	--	na	--	1.1E+01	--	na	--	2.9E+00	--	na	--	2.9E+00	--	na	--	**2.9E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	4.0E+01	--	--	na	4.0E+00	--	--	na	4.0E+00	**--**	**--**	**na**	**4.0E+00**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	na	3.3E+00	--	--	na	3.3E+00	**--**	**--**	**na**	**3.3E+00**
Thallium	0	--	--	na	4.7E-01	--	--	na	4.7E-01	--	--	na	4.7E-02	--	--	na	4.7E-02	**--**	**--**	**na**	**4.7E-02**
Toluene	0	--	--	na	6.0E+03	--	--	na	6.0E+03	--	--	na	6.0E+02	--	--	na	6.0E+02	**--**	**--**	**na**	**6.0E+02**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	7.3E-01	2.0E-04	na	2.8E-03	1.8E-01	5.0E-05	na	2.8E-04	1.8E-01	5.0E-05	na	2.8E-04	**1.8E-01**	**5.0E-05**	**na**	**2.8E-04**
Tributyltin	0	4.6E-01	7.2E-02	na	--	4.6E-01	7.2E-02	na	--	1.2E-01	1.8E-02	na	--	1.2E-01	1.8E-02	na	--	**1.2E-01**	**1.8E-02**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	7.0E+01	--	--	na	7.0E+00	--	--	na	7.0E+00	**--**	**--**	**na**	**7.0E+00**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	na	1.6E+01	--	--	na	1.6E+01	**--**	**--**	**na**	**1.6E+01**
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	3.0E+02	--	--	na	3.0E+01	--	--	na	3.0E+01	**--**	**--**	**na**	**3.0E+01**
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	na	2.4E+00	--	--	na	2.4E+00	**--**	**--**	**na**	**2.4E+00**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	na	--	--	--	na	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	na	2.4E+00	--	--	na	2.4E+00	**--**	**--**	**na**	**2.4E+00**
Zinc	0	2.1E+02	2.1E+02	na	2.6E+04	2.1E+02	2.1E+02	na	2.6E+04	5.3E+01	5.3E+01	na	2.6E+03	5.3E+01	5.3E+01	na	2.6E+03	**5.3E+01**	**5.3E+01**	**na**	**2.6E+03**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	6.4E+01
Arsenic	2.3E+01
Barium	na
Cadmium	2.9E-01
Chromium III	2.0E+01
Chromium VI	1.6E+00
Copper	2.4E+00
Iron	na
Lead	4.9E+00
Manganese	na
Mercury	1.2E-01
Nickel	5.5E+00
Selenium	7.5E-01
Silver	1.1E+00
Zinc	2.1E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Zion Crossroads WWTP Outfalls 002/003

Permit No.: VA0090743

Receiving Stream: South Anna River

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	35	mg/L
90% Temperature (Annual) =	24.5	deg C
90% Temperature (Wet season) =	15	deg C
90% Maximum pH =	7.4	SU
10% Maximum pH =	6.8	SU
Tier Designation (1 or 2) =	1	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	0.09	MGD
7Q10 (Annual) =	0.13	MGD
30Q10 (Annual) =	0.2	MGD
1Q10 (Wet season) =	3.31	MGD
30Q10 (Wet season)	9.25	MGD
30Q5 =	0.49	MGD
Harmonic Mean =		MGD

Mixing Information

Annual - 1Q10 Mix =	4.3	%
- 7Q10 Mix =	100	%
- 30Q10 Mix =	100	%
Wet Season - 1Q10 Mix =	100	%
- 30Q10 Mix =	100	%

Effluent Information

Mean Hardness (as CaCO3) =	201	mg/L
90% Temp (Annual) =	23	deg C
90% Temp (Wet season) =	15	deg C
90% Maximum pH =	8	SU
10% Maximum pH =	7.6	SU
Discharge Flow =	0.311	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	9.9E+02	--	--	na	2.5E+03	--	--	--	--	--	--	--	--	--	--	na	2.5E+03
Acrolein	0	--	--	na	9.3E+00	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	--	--	na	2.4E+01
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	2.5E+00	--	--	--	--	--	--	--	--	--	--	na	2.5E+00
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	3.0E+00	--	na	5.0E-04	--	--	--	--	--	--	--	--	3.0E+00	--	na	5.0E-04
Ammonia-N (mg/l) (Yearly)	0	8.66E+00	2.07E+00	na	--	8.77E+00	3.41E+00	na	--	--	--	--	--	--	--	--	--	8.77E+00	3.41E+00	na	--
Ammonia-N (mg/l) (High Flow)	0	2.21E+01	4.55E+00	na	--	2.57E+02	1.40E+02	na	--	--	--	--	--	--	--	--	--	2.57E+02	1.40E+02	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	1.0E+05	--	--	--	--	--	--	--	--	--	--	na	1.0E+05
Antimony	0	--	--	na	6.4E+02	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	--	--	na	1.6E+03
Arsenic	0	3.4E+02	1.5E+02	na	--	3.4E+02	2.1E+02	na	--	--	--	--	--	--	--	--	--	3.4E+02	2.1E+02	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	5.1E+02	--	--	--	--	--	--	--	--	--	--	na	5.1E+02
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	2.0E-03	--	--	--	--	--	--	--	--	--	--	na	2.0E-03
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	5.3E+00	--	--	--	--	--	--	--	--	--	--	na	5.3E+00
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	1.7E+05	--	--	--	--	--	--	--	--	--	--	na	1.7E+05
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	2.2E+01	--	--	--	--	--	--	--	--	--	--	na	2.2E+01
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	--	--	na	1.4E+03
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	4.9E+03	--	--	--	--	--	--	--	--	--	--	na	4.9E+03
Cadmium	0	8.5E+00	1.6E+00	na	--	8.6E+00	2.2E+00	na	--	--	--	--	--	--	--	--	--	8.6E+00	2.2E+00	na	--
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	1.6E+01	--	--	--	--	--	--	--	--	--	--	na	1.6E+01
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	2.4E+00	6.1E-03	na	8.1E-03	--	--	--	--	--	--	--	--	2.4E+00	6.1E-03	na	8.1E-03
Chloride	0	8.6E+05	2.3E+05	na	--	8.7E+05	3.3E+05	na	--	--	--	--	--	--	--	--	--	8.7E+05	3.3E+05	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.6E+01	na	--	--	--	--	--	--	--	--	--	1.9E+01	1.6E+01	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	4.1E+03	--	--	--	--	--	--	--	--	--	--	na	4.1E+03

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	--	--	na	1.3E+02
Chloroform	0	--	--	na	1.1E+04	--	--	na	2.8E+04	--	--	--	--	--	--	--	--	--	--	na	2.8E+04
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	4.1E+03	--	--	--	--	--	--	--	--	--	--	na	4.1E+03
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	3.9E+02	--	--	--	--	--	--	--	--	--	--	na	3.9E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.4E-02	5.8E-02	na	--	--	--	--	--	--	--	--	--	8.4E-02	5.8E-02	na	--
Chromium III	0	1.0E+03	1.0E+02	na	--	1.0E+03	1.5E+02	na	--	--	--	--	--	--	--	--	--	1.0E+03	1.5E+02	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.6E+01	na	--	--	--	--	--	--	--	--	--	1.6E+01	1.6E+01	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene [C]	0	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	--	--	--	--	--	--	--	--	na	1.8E-02
Copper	0	2.6E+01	1.3E+01	na	--	2.6E+01	1.8E+01	na	--	--	--	--	--	--	--	--	--	2.6E+01	1.8E+01	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.2E+01	7.4E+00	na	4.1E+04	--	--	--	--	--	--	--	--	2.2E+01	7.4E+00	na	4.1E+04
DDD [C]	0	--	--	na	3.1E-03	--	--	na	3.1E-03	--	--	--	--	--	--	--	--	--	--	na	3.1E-03
DDE [C]	0	--	--	na	2.2E-03	--	--	na	2.2E-03	--	--	--	--	--	--	--	--	--	--	na	2.2E-03
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.1E+00	1.4E-03	na	2.2E-03	--	--	--	--	--	--	--	--	1.1E+00	1.4E-03	na	2.2E-03
Demeton	0	--	1.0E-01	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	--	1.4E-01	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.7E-01	2.4E-01	na	--	--	--	--	--	--	--	--	--	1.7E-01	2.4E-01	na	--
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	3.3E+03	--	--	--	--	--	--	--	--	--	--	na	3.3E+03
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	2.5E+03	--	--	--	--	--	--	--	--	--	--	na	2.5E+03
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	4.9E+02	--	--	--	--	--	--	--	--	--	--	na	4.9E+02
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	2.8E-01	--	--	--	--	--	--	--	--	--	--	na	2.8E-01
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	--	--	na	1.7E+02
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	--	--	--	--	--	--	--	--	na	3.7E+02
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	1.8E+04	--	--	--	--	--	--	--	--	--	--	na	1.8E+04
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	2.6E+04	--	--	--	--	--	--	--	--	--	--	na	2.6E+04
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	7.5E+02	--	--	--	--	--	--	--	--	--	--	na	7.5E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	na	1.5E+02
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	2.1E+02	--	--	--	--	--	--	--	--	--	--	na	2.1E+02
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	2.4E-01	7.9E-02	na	5.4E-04	--	--	--	--	--	--	--	--	2.4E-01	7.9E-02	na	5.4E-04
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	1.1E+05	--	--	--	--	--	--	--	--	--	--	na	1.1E+05
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	2.2E+03	--	--	--	--	--	--	--	--	--	--	na	2.2E+03
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	2.8E+06	--	--	--	--	--	--	--	--	--	--	na	2.8E+06
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	--	--	na	1.2E+04
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	1.4E+04	--	--	--	--	--	--	--	--	--	--	na	1.4E+04
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	7.2E+02	--	--	--	--	--	--	--	--	--	--	na	7.2E+02
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	3.4E+01	--	--	--	--	--	--	--	--	--	--	na	3.4E+01
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	1.3E-07	--	--	--	--	--	--	--	--	--	--	na	1.3E-07
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	2.0E+00	--	--	--	--	--	--	--	--	--	--	na	2.0E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	7.9E-02	na	2.3E+02	--	--	--	--	--	--	--	--	2.2E-01	7.9E-02	na	2.3E+02
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	7.9E-02	na	2.3E+02	--	--	--	--	--	--	--	--	2.2E-01	7.9E-02	na	2.3E+02
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.2E-01	7.9E-02	--	--	--	--	--	--	--	--	--	--	2.2E-01	7.9E-02	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	2.3E+02	--	--	--	--	--	--	--	--	--	--	na	2.3E+02
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	8.7E-02	5.1E-02	na	1.5E-01	--	--	--	--	--	--	--	--	8.7E-02	5.1E-02	na	1.5E-01
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	7.7E-01	--	--	--	--	--	--	--	--	--	--	na	7.7E-01

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	5.4E+03	--	--	--	--	--	--	--	--	--	--	na	5.4E+03
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	3.6E+02	--	--	--	--	--	--	--	--	--	--	na	3.6E+02
Fluorene	0	--	--	na	5.3E+03	--	--	na	1.4E+04	--	--	--	--	--	--	--	--	--	--	na	1.4E+04
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
Heptachlor [c]	0	5.2E-01	3.8E-03	na	7.9E-04	5.3E-01	5.4E-03	na	7.9E-04	--	--	--	--	--	--	--	--	5.3E-01	5.4E-03	na	7.9E-04
Heptachlor Epoxide[c]	0	5.2E-01	3.8E-03	na	3.9E-04	5.3E-01	5.4E-03	na	3.9E-04	--	--	--	--	--	--	--	--	5.3E-01	5.4E-03	na	3.9E-04
Hexachlorobenzene[c]	0	--	--	na	2.9E-03	--	--	na	2.9E-03	--	--	--	--	--	--	--	--	--	--	na	2.9E-03
Hexachlorobutadiene[c]	0	--	--	na	1.8E+02	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	--	--	na	1.8E+02
Hexachlorocyclohexane Alpha-BHC[c]	0	--	--	na	4.9E-02	--	--	na	4.9E-02	--	--	--	--	--	--	--	--	--	--	na	4.9E-02
Hexachlorocyclohexane Beta-BHC[c]	0	--	--	na	1.7E-01	--	--	na	1.7E-01	--	--	--	--	--	--	--	--	--	--	na	1.7E-01
Hexachlorocyclohexane Gamma-BHC[c] (Lindane)	0	9.5E-01	na	na	1.8E+00	9.6E-01	--	na	1.8E+00	--	--	--	--	--	--	--	--	9.6E-01	--	na	1.8E+00
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	2.8E+03	--	--	--	--	--	--	--	--	--	--	na	2.8E+03
Hexachloroethane[c]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	--	--	na	3.3E+01
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.8E+00	na	--	--	--	--	--	--	--	--	--	--	2.8E+00	na	--
Indeno (1,2,3-cd) pyrene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone[c]	0	--	--	na	9.6E+03	--	--	na	9.6E+03	--	--	--	--	--	--	--	--	--	--	na	9.6E+03
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	2.9E+02	2.3E+01	na	--	2.9E+02	3.3E+01	na	--	--	--	--	--	--	--	--	--	2.9E+02	3.3E+01	na	--
Malathion	0	--	1.0E-01	na	--	--	1.4E-01	na	--	--	--	--	--	--	--	--	--	--	1.4E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.4E+00	1.1E+00	--	--	--	--	--	--	--	--	--	--	1.4E+00	1.1E+00	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	3.9E+03	--	--	--	--	--	--	--	--	--	--	na	3.9E+03
Methylene Chloride [c]	0	--	--	na	5.9E+03	--	--	na	5.9E+03	--	--	--	--	--	--	--	--	--	--	na	5.9E+03
Methoxychlor	0	--	3.0E-02	na	--	--	4.3E-02	na	--	--	--	--	--	--	--	--	--	--	4.3E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Nickel	0	3.3E+02	2.9E+01	na	4.6E+03	3.3E+02	4.1E+01	na	1.2E+04	--	--	--	--	--	--	--	--	3.3E+02	4.1E+01	na	1.2E+04
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	1.8E+03	--	--	--	--	--	--	--	--	--	--	na	1.8E+03
N-Nitrosodimethylamine[c]	0	--	--	na	3.0E+01	--	--	na	3.0E+01	--	--	--	--	--	--	--	--	--	--	na	3.0E+01
N-Nitrosodiphenylamine[c]	0	--	--	na	6.0E+01	--	--	na	6.0E+01	--	--	--	--	--	--	--	--	--	--	na	6.0E+01
N-Nitrosodi-n-propylamine[c]	0	--	--	na	5.1E+00	--	--	na	5.1E+00	--	--	--	--	--	--	--	--	--	--	na	5.1E+00
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.8E+01	9.4E+00	na	--	--	--	--	--	--	--	--	--	2.8E+01	9.4E+00	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	6.6E-02	1.8E-02	na	--	--	--	--	--	--	--	--	--	6.6E-02	1.8E-02	na	--
PCB Total[c]	0	--	1.4E-02	na	6.4E-04	--	2.0E-02	na	6.4E-04	--	--	--	--	--	--	--	--	--	2.0E-02	na	6.4E-04
Pentachlorophenol [c]	0	1.6E+01	8.1E+00	na	3.0E+01	1.6E+01	1.1E+01	na	3.0E+01	--	--	--	--	--	--	--	--	1.6E+01	1.1E+01	na	3.0E+01
Phenol	0	--	--	na	8.6E+05	--	--	na	2.2E+06	--	--	--	--	--	--	--	--	--	--	na	2.2E+06
Pyrene	0	--	--	na	4.0E+03	--	--	na	1.0E+04	--	--	--	--	--	--	--	--	--	--	na	1.0E+04
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.0E+01	7.1E+00	na	1.1E+04	--	--	--	--	--	--	--	--	**2.0E+01**	**7.1E+00**	**na**	**1.1E+04**
Silver	0	1.1E+01	--	na	--	1.1E+01	--	na	--	--	--	--	--	--	--	--	--	**1.1E+01**	--	**na**	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	4.0E+01	--	--	--	--	--	--	--	--	--	--	**na**	**4.0E+01**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	--	--	**na**	**3.3E+01**
Thallium	0	--	--	na	4.7E-01	--	--	na	1.2E+00	--	--	--	--	--	--	--	--	--	--	**na**	**1.2E+00**
Toluene	0	--	--	na	6.0E+03	--	--	na	1.5E+04	--	--	--	--	--	--	--	--	--	--	**na**	**1.5E+04**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	7.4E-01	2.8E-04	na	2.8E-03	--	--	--	--	--	--	--	--	**7.4E-01**	**2.8E-04**	**na**	**2.8E-03**
Tributyltin	0	4.6E-01	7.2E-02	na	--	4.7E-01	1.0E-01	na	--	--	--	--	--	--	--	--	--	**4.7E-01**	**1.0E-01**	**na**	--
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E+02**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.6E+02**
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	--	--	**na**	**3.0E+02**
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	--	--	**na**	**2.4E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	--	--	**na**	**2.4E+01**
Zinc	0	2.1E+02	1.7E+02	na	2.6E+04	2.1E+02	2.4E+02	na	6.7E+04	--	--	--	--	--	--	--	--	**2.1E+02**	**2.4E+02**	**na**	**6.7E+04**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	1.6E+03
Arsenic	1.3E+02
Barium	na
Cadmium	1.3E+00
Chromium III	8.9E+01
Chromium VI	6.5E+00
Copper	1.0E+01
Iron	na
Lead	2.0E+01
Manganese	na
Mercury	5.7E-01
Nickel	2.5E+01
Selenium	4.3E+00
Silver	4.6E+00
Zinc	8.5E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Zion Crossroads WWTP Permit No.: VA0090743

Receiving Stream: South Anna River outfalls 003/004

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	35	mg/L
90% Temperature (Annual) =	24.5	deg C
90% Temperature (Wet season) =	15	deg C
90% Maximum pH =	7.4	SU
10% Maximum pH =	6.8	SU
Tier Designation (1 or 2) =	1	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	0.09	MGD
7Q10 (Annual) =	0.13	MGD
30Q10 (Annual) =	0.2	MGD
1Q10 (Wet season) =	3.31	MGD
30Q10 (Wet season)	9.25	MGD
30Q5 =	0.49	MGD
Harmonic Mean =		MGD

Mixing Information

Annual - 1Q10 Mix =	7.92	%
- 7Q10 Mix =	100	%
- 30Q10 Mix =	100	%
Wet Season - 1Q10 Mix =	100	%
- 30Q10 Mix =	100	%

Effluent Information

Mean Hardness (as CaCO3) =	201	mg/L
90% Temp (Annual) =	23	deg C
90% Temp (Wet season) =	15	deg C
90% Maximum pH =	8	SU
10% Maximum pH =	7.6	SU
Discharge Flow =	0.7	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	9.9E+02	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	--	--	na	1.7E+03
Acrolein	0	--	--	na	9.3E+00	--	--	na	1.6E+01	--	--	--	--	--	--	--	--	--	--	na	1.6E+01
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	2.5E+00	--	--	--	--	--	--	--	--	--	--	na	2.5E+00
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	3.0E+00	--	na	5.0E-04	--	--	--	--	--	--	--	--	3.0E+00	--	na	5.0E-04
Ammonia-N (mg/l) (Yearly)	0	8.61E+00	1.85E+00	na	--	8.70E+00	2.38E+00	na	--	--	--	--	--	--	--	--	--	8.70E+00	2.38E+00	na	--
Ammonia-N (mg/l) (High Flow)	0	2.11E+01	4.51E+00	na	--	1.21E+02	6.41E+01	na	--	--	--	--	--	--	--	--	--	1.21E+02	6.41E+01	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	6.8E+04	--	--	--	--	--	--	--	--	--	--	na	6.8E+04
Antimony	0	--	--	na	6.4E+02	--	--	na	1.1E+03	--	--	--	--	--	--	--	--	--	--	na	1.1E+03
Arsenic	0	3.4E+02	1.5E+02	na	--	3.4E+02	1.8E+02	na	--	--	--	--	--	--	--	--	--	3.4E+02	1.8E+02	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	5.1E+02	--	--	--	--	--	--	--	--	--	--	na	5.1E+02
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	2.0E-03	--	--	--	--	--	--	--	--	--	--	na	2.0E-03
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	5.3E+00	--	--	--	--	--	--	--	--	--	--	na	5.3E+00
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	1.1E+05	--	--	--	--	--	--	--	--	--	--	na	1.1E+05
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	2.2E+01	--	--	--	--	--	--	--	--	--	--	na	2.2E+01
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	--	--	na	1.4E+03
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	3.2E+03	--	--	--	--	--	--	--	--	--	--	na	3.2E+03
Cadmium	0	8.5E+00	1.8E+00	na	--	8.6E+00	2.1E+00	na	--	--	--	--	--	--	--	--	--	8.6E+00	2.1E+00	na	--
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	1.6E+01	--	--	--	--	--	--	--	--	--	--	na	1.6E+01
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	2.4E+00	5.1E-03	na	8.1E-03	--	--	--	--	--	--	--	--	2.4E+00	5.1E-03	na	8.1E-03
Chloride	0	8.6E+05	2.3E+05	na	--	8.7E+05	2.7E+05	na	--	--	--	--	--	--	--	--	--	8.7E+05	2.7E+05	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.3E+01	na	--	--	--	--	--	--	--	--	--	1.9E+01	1.3E+01	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	2.7E+03	--	--	--	--	--	--	--	--	--	--	na	2.7E+03

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	--	--	na	1.3E+02
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.9E+04	--	--	--	--	--	--	--	--	--	--	na	1.9E+04
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	2.7E+03	--	--	--	--	--	--	--	--	--	--	na	2.7E+03
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	2.6E+02	--	--	--	--	--	--	--	--	--	--	na	2.6E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.4E-02	4.9E-02	na	--	--	--	--	--	--	--	--	--	8.4E-02	4.9E-02	na	--
Chromium III	0	1.0E+03	1.2E+02	na	--	1.0E+03	1.4E+02	na	--	--	--	--	--	--	--	--	--	1.0E+03	1.4E+02	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.3E+01	na	--	--	--	--	--	--	--	--	--	1.6E+01	1.3E+01	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene [C]	0	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	--	--	--	--	--	--	--	--	na	1.8E-02
Copper	0	2.6E+01	1.4E+01	na	--	2.6E+01	1.7E+01	na	--	--	--	--	--	--	--	--	--	2.6E+01	1.7E+01	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.2E+01	6.2E+00	na	2.7E+04	--	--	--	--	--	--	--	--	2.2E+01	6.2E+00	na	2.7E+04
DDD [C]	0	--	--	na	3.1E-03	--	--	na	3.1E-03	--	--	--	--	--	--	--	--	--	--	na	3.1E-03
DDE [C]	0	--	--	na	2.2E-03	--	--	na	2.2E-03	--	--	--	--	--	--	--	--	--	--	na	2.2E-03
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.1E+00	1.2E-03	na	2.2E-03	--	--	--	--	--	--	--	--	1.1E+00	1.2E-03	na	2.2E-03
Demeton	0	--	1.0E-01	na	--	--	1.2E-01	na	--	--	--	--	--	--	--	--	--	--	1.2E-01	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.7E-01	2.0E-01	na	--	--	--	--	--	--	--	--	--	1.7E-01	2.0E-01	na	--
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	2.2E+03	--	--	--	--	--	--	--	--	--	--	na	2.2E+03
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	--	--	na	1.6E+03
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	3.2E+02	--	--	--	--	--	--	--	--	--	--	na	3.2E+02
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	2.8E-01	--	--	--	--	--	--	--	--	--	--	na	2.8E-01
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	--	--	na	1.7E+02
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	--	--	--	--	--	--	--	--	na	3.7E+02
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	--	--	na	1.2E+04
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	--	--	na	1.7E+04
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	4.9E+02	--	--	--	--	--	--	--	--	--	--	na	4.9E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	na	1.5E+02
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	2.1E+02	--	--	--	--	--	--	--	--	--	--	na	2.1E+02
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	2.4E-01	6.6E-02	na	5.4E-04	--	--	--	--	--	--	--	--	2.4E-01	6.6E-02	na	5.4E-04
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	7.5E+04	--	--	--	--	--	--	--	--	--	--	na	7.5E+04
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	--	--	na	1.4E+03
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.9E+06	--	--	--	--	--	--	--	--	--	--	na	1.9E+06
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	7.7E+03	--	--	--	--	--	--	--	--	--	--	na	7.7E+03
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	9.0E+03	--	--	--	--	--	--	--	--	--	--	na	9.0E+03
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	4.8E+02	--	--	--	--	--	--	--	--	--	--	na	4.8E+02
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	3.4E+01	--	--	--	--	--	--	--	--	--	--	na	3.4E+01
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	8.7E-08	--	--	--	--	--	--	--	--	--	--	na	8.7E-08
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	2.0E+00	--	--	--	--	--	--	--	--	--	--	na	2.0E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	6.6E-02	na	1.5E+02	--	--	--	--	--	--	--	--	2.2E-01	6.6E-02	na	1.5E+02
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	6.6E-02	na	1.5E+02	--	--	--	--	--	--	--	--	2.2E-01	6.6E-02	na	1.5E+02
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.2E-01	6.6E-02	--	--	--	--	--	--	--	--	--	--	2.2E-01	6.6E-02	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	na	1.5E+02
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	8.7E-02	4.3E-02	na	1.0E-01	--	--	--	--	--	--	--	--	8.7E-02	4.3E-02	na	1.0E-01
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	5.1E-01	--	--	--	--	--	--	--	--	--	--	na	5.1E-01

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	3.6E+03	--	--	--	--	--	--	--	--	--	--	na	3.6E+03
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	2.4E+02	--	--	--	--	--	--	--	--	--	--	na	2.4E+02
Fluorene	0	--	--	na	5.3E+03	--	--	na	9.0E+03	--	--	--	--	--	--	--	--	--	--	na	9.0E+03
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.2E-02	na	--	--	--	--	--	--	--	--	--	--	1.2E-02	na	--
Heptachlor [c]	0	5.2E-01	3.8E-03	na	7.9E-04	5.3E-01	4.5E-03	na	7.9E-04	--	--	--	--	--	--	--	--	5.3E-01	4.5E-03	na	7.9E-04
Heptachlor Epoxide[c]	0	5.2E-01	3.8E-03	na	3.9E-04	5.3E-01	4.5E-03	na	3.9E-04	--	--	--	--	--	--	--	--	5.3E-01	4.5E-03	na	3.9E-04
Hexachlorobenzene[c]	0	--	--	na	2.9E-03	--	--	na	2.9E-03	--	--	--	--	--	--	--	--	--	--	na	2.9E-03
Hexachlorobutadiene[c]	0	--	--	na	1.8E+02	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	--	--	na	1.8E+02
Hexachlorocyclohexane Alpha-BHC[c]	0	--	--	na	4.9E-02	--	--	na	4.9E-02	--	--	--	--	--	--	--	--	--	--	na	4.9E-02
Hexachlorocyclohexane Beta-BHC[c]	0	--	--	na	1.7E-01	--	--	na	1.7E-01	--	--	--	--	--	--	--	--	--	--	na	1.7E-01
Hexachlorocyclohexane Gamma-BHC[c] (Lindane)	0	9.5E-01	na	na	1.8E+00	9.6E-01	--	na	1.8E+00	--	--	--	--	--	--	--	--	9.6E-01	--	na	1.8E+00
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	--	--	na	1.9E+03
Hexachloroethane[c]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	--	--	na	3.3E+01
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.4E+00	na	--	--	--	--	--	--	--	--	--	--	2.4E+00	na	--
Indeno (1,2,3-cd) pyrene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone[c]	0	--	--	na	9.6E+03	--	--	na	9.6E+03	--	--	--	--	--	--	--	--	--	--	na	9.6E+03
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	2.9E+02	2.8E+01	na	--	2.9E+02	3.3E+01	na	--	--	--	--	--	--	--	--	--	2.9E+02	3.3E+01	na	--
Malathion	0	--	1.0E-01	na	--	--	1.2E-01	na	--	--	--	--	--	--	--	--	--	--	1.2E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.4E+00	9.1E-01	--	--	--	--	--	--	--	--	--	--	1.4E+00	9.1E-01	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	2.6E+03	--	--	--	--	--	--	--	--	--	--	na	2.6E+03
Methylene Chloride [c]	0	--	--	na	5.9E+03	--	--	na	5.9E+03	--	--	--	--	--	--	--	--	--	--	na	5.9E+03
Methoxychlor	0	--	3.0E-02	na	--	--	3.6E-02	na	--	--	--	--	--	--	--	--	--	--	3.6E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Nickel	0	3.3E+02	3.3E+01	na	4.6E+03	3.3E+02	3.9E+01	na	7.8E+03	--	--	--	--	--	--	--	--	3.3E+02	3.9E+01	na	7.8E+03
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	1.2E+03	--	--	--	--	--	--	--	--	--	--	na	1.2E+03
N-Nitrosodimethylamine[c]	0	--	--	na	3.0E+01	--	--	na	3.0E+01	--	--	--	--	--	--	--	--	--	--	na	3.0E+01
N-Nitrosodiphenylamine[c]	0	--	--	na	6.0E+01	--	--	na	6.0E+01	--	--	--	--	--	--	--	--	--	--	na	6.0E+01
N-Nitrosodi-n-propylamine[c]	0	--	--	na	5.1E+00	--	--	na	5.1E+00	--	--	--	--	--	--	--	--	--	--	na	5.1E+00
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.8E+01	7.8E+00	na	--	--	--	--	--	--	--	--	--	2.8E+01	7.8E+00	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	6.6E-02	1.5E-02	na	--	--	--	--	--	--	--	--	--	6.6E-02	1.5E-02	na	--
PCB Total[c]	0	--	1.4E-02	na	6.4E-04	--	1.7E-02	na	6.4E-04	--	--	--	--	--	--	--	--	--	1.7E-02	na	6.4E-04
Pentachlorophenol [c]	0	1.6E+01	9.4E+00	na	3.0E+01	1.6E+01	1.1E+01	na	3.0E+01	--	--	--	--	--	--	--	--	1.6E+01	1.1E+01	na	3.0E+01
Phenol	0	--	--	na	8.6E+05	--	--	na	1.5E+06	--	--	--	--	--	--	--	--	--	--	na	1.5E+06
Pyrene	0	--	--	na	4.0E+03	--	--	na	6.8E+03	--	--	--	--	--	--	--	--	--	--	na	6.8E+03
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.0E+01	5.9E+00	na	7.1E+03	--	--	--	--	--	--	--	--	2.0E+01	5.9E+00	na	7.1E+03
Silver	0	1.1E+01	--	na	--	1.1E+01	--	na	--	--	--	--	--	--	--	--	--	1.1E+01	--	na	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	4.0E+01	--	--	--	--	--	--	--	--	--	--	na	4.0E+01
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	--	--	na	3.3E+01
Thallium	0	--	--	na	4.7E-01	--	--	na	8.0E-01	--	--	--	--	--	--	--	--	--	--	na	8.0E-01
Toluene	0	--	--	na	6.0E+03	--	--	na	1.0E+04	--	--	--	--	--	--	--	--	--	--	na	1.0E+04
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	7.4E-01	2.4E-04	na	2.8E-03	--	--	--	--	--	--	--	--	7.4E-01	2.4E-04	na	2.8E-03
Tributyltin	0	4.6E-01	7.2E-02	na	--	4.6E-01	8.5E-02	na	--	--	--	--	--	--	--	--	--	4.6E-01	8.5E-02	na	--
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	1.2E+02	--	--	--	--	--	--	--	--	--	--	na	1.2E+02
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	--	--	na	1.6E+02
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	--	--	na	3.0E+02
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	--	--	na	2.4E+01
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	--	--	na	2.4E+01
Zinc	0	2.1E+02	1.9E+02	na	2.6E+04	2.1E+02	2.3E+02	na	4.4E+04	--	--	--	--	--	--	--	--	2.1E+02	2.3E+02	na	4.4E+04

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing information. Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	1.1E+03
Arsenic	1.1E+02
Barium	na
Cadmium	1.3E+00
Chromium III	8.3E+01
Chromium VI	6.5E+00
Copper	1.0E+01
Iron	na
Lead	2.0E+01
Manganese	na
Mercury	5.5E-01
Nickel	2.3E+01
Selenium	3.6E+00
Silver	4.6E+00
Zinc	8.5E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

Mixing Zone Predictions for Zion Crossroads WWTP

Effluent Flow = 0.311 MGD
Stream 7Q10 = 0.13 MGD
Stream 30Q10 = 0.2 MGD
Stream 1Q10 = 0.09 MGD
Stream slope = 14 ft/ft
Stream width = 50 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = .0072 ft
Length = 145395.73 ft
Velocity = 1.8922 ft/sec
Residence Time = .8894 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = .0079 ft
Length = 135066.75 ft
Velocity = 2.007 ft/sec
Residence Time = .7789 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = .0068 ft
Length = 152478.65 ft
Velocity = 1.8215 ft/sec
Residence Time = 23.2523 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 4.3% of the 1Q10 is used.

Mixing Zone Predictions for Zion Crossroads WWTP

Effluent Flow = 0.7 MGD
Stream 7Q10 = 0.13 MGD
Stream 30Q10 = 0.2 MGD
Stream 1Q10 = 0.09 MGD
Stream slope = 14 ft/ft
Stream width = 50 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = .0105 ft
Length = 105967.79 ft
Velocity = 2.4366 ft/sec
Residence Time = .5033 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = .0111 ft
Length = 101764.49 ft
Velocity = 2.5168 ft/sec
Residence Time = .468 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = .0102 ft
Length = 108622.91 ft
Velocity = 2.389 ft/sec
Residence Time = 12.63 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 7.92% of the 1Q10 is used.

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Zion Crossroads WWTP Outfall 004 Permit No.: VA0090743

Receiving Stream: South Anna River

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	35	mg/L
90% Temperature (Annual) =	24.5	deg C
90% Temperature (Wet season) =	15	deg C
90% Maximum pH =	7.4	SU
10% Maximum pH =	6.8	SU
Tier Designation (1 or 2) =	1	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows

1Q10 (Annual) =	0.11	MGD
7Q10 (Annual) =	0.16	MGD
30Q10 (Annual) =	0.25	MGD
1Q10 (Wet season) =	4.08	MGD
30Q10 (Wet season)	11.37	MGD
30Q5 =	0.6	MGD
Harmonic Mean =		MGD

Mixing Information

Annual - 1Q10 Mix =	2.6	%
- 7Q10 Mix =	100	%
- 30Q10 Mix =	100	%
Wet Season - 1Q10 Mix =	100	%
- 30Q10 Mix =	100	%

Effluent Information

Mean Hardness (as CaCO3) =	201	mg/L
90% Temp (Annual) =	23	deg C
90% Temp (Wet season) =	15	deg.C
90% Maximum pH =	8	SU
10% Maximum pH =	7.6	SU
Discharge Flow =	0.311	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	9.9E+02	--	--	na	2.9E+03	--	--	--	--	--	--	--	--	--	--	na	2.9E+03
Acrolein	0	--	--	na	9.3E+00	--	--	na	2.7E+01	--	--	--	--	--	--	--	--	--	--	na	2.7E+01
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	2.5E+00	--	--	--	--	--	--	--	--	--	--	na	2.5E+00
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	3.0E+00	--	na	5.0E-04	--	--	--	--	--	--	--	--	3.0E+00	--	na	5.0E-04
Ammonia-N (mg/l) (Yearly)	0	8.59E+00	2.13E+00	na	--	8.67E+00	3.85E+00	na	--	--	--	--	--	--	--	--	--	8.67E+00	3.85E+00	na	--
Ammonia-N (mg/l) (High Flow)	0	2.22E+01	4.56E+00	na	--	3.14E+02	1.71E+02	na	--	--	--	--	--	--	--	--	--	3.14E+02	1.71E+02	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	--	--	na	1.2E+05
Antimony	0	--	--	na	6.4E+02	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	--	--	na	1.9E+03
Arsenic	0	3.4E+02	1.5E+02	na	--	3.4E+02	2.3E+02	na	--	--	--	--	--	--	--	--	--	3.4E+02	2.3E+02	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	5.1E+02	--	--	--	--	--	--	--	--	--	--	na	5.1E+02
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	2.0E-03	--	--	--	--	--	--	--	--	--	--	na	2.0E-03
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	5.3E+00	--	--	--	--	--	--	--	--	--	--	na	5.3E+00
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	1.9E+05	--	--	--	--	--	--	--	--	--	--	na	1.9E+05
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	2.2E+01	--	--	--	--	--	--	--	--	--	--	na	2.2E+01
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	--	--	na	1.4E+03
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	5.6E+03	--	--	--	--	--	--	--	--	--	--	na	5.6E+03
Cadmium	0	8.5E+00	1.5E+00	na	--	8.6E+00	2.3E+00	na	--	--	--	--	--	--	--	--	--	8.6E+00	2.3E+00	na	--
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	1.6E+01	--	--	--	--	--	--	--	--	--	--	na	1.6E+01
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	2.4E+00	6.5E-03	na	8.1E-03	--	--	--	--	--	--	--	--	2.4E+00	6.5E-03	na	8.1E-03
Chloride	0	8.6E+05	2.3E+05	na	--	8.7E+05	3.5E+05	na	--	--	--	--	--	--	--	--	--	8.7E+05	3.5E+05	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.7E+01	na	--	--	--	--	--	--	--	--	--	1.9E+01	1.7E+01	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	4.7E+03	--	--	--	--	--	--	--	--	--	--	na	4.7E+03

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	--	--	na	**1.3E+02**
Chloroform	0	--	--	na	1.1E+04	--	--	na	3.2E+04	--	--	--	--	--	--	--	--	--	--	na	**3.2E+04**
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	4.7E+03	--	--	--	--	--	--	--	--	--	--	na	**4.7E+03**
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	4.4E+02	--	--	--	--	--	--	--	--	--	--	na	**4.4E+02**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.4E-02	6.2E-02	na	--	--	--	--	--	--	--	--	--	**8.4E-02**	**6.2E-02**	na	--
Chromium III	0	1.0E+03	1.0E+02	na	--	1.0E+03	1.5E+02	na	--	--	--	--	--	--	--	--	--	**1.0E+03**	**1.5E+02**	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.7E+01	na	--	--	--	--	--	--	--	--	--	**1.6E+01**	**1.7E+01**	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene[C]	0	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	--	--	--	--	--	--	--	--	na	**1.8E-02**
Copper	0	2.6E+01	1.2E+01	na	--	2.6E+01	1.9E+01	na	--	--	--	--	--	--	--	--	--	**2.6E+01**	**1.9E+01**	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.2E+01	7.9E+00	na	4.7E+04	--	--	--	--	--	--	--	--	**2.2E+01**	**7.9E+00**	na	**4.7E+04**
DDD[C]	0	--	--	na	3.1E-03	--	--	na	3.1E-03	--	--	--	--	--	--	--	--	--	--	na	**3.1E-03**
DDE[C]	0	--	--	na	2.2E-03	--	--	na	2.2E-03	--	--	--	--	--	--	--	--	--	--	na	**2.2E-03**
DDT[C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.1E+00	1.5E-03	na	2.2E-03	--	--	--	--	--	--	--	--	**1.1E+00**	**1.5E-03**	na	**2.2E-03**
Demeton	0	--	1.0E-01	na	--	--	1.5E-01	na	--	--	--	--	--	--	--	--	--	--	**1.5E-01**	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.7E-01	2.6E-01	na	--	--	--	--	--	--	--	--	--	**1.7E-01**	**2.6E-01**	na	--
Dibenz(a,h)anthracene[C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	**1.8E-01**
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	3.8E+03	--	--	--	--	--	--	--	--	--	--	na	**3.8E+03**
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	2.8E+03	--	--	--	--	--	--	--	--	--	--	na	**2.8E+03**
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	5.6E+02	--	--	--	--	--	--	--	--	--	--	na	**5.6E+02**
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	2.8E-01	--	--	--	--	--	--	--	--	--	--	na	**2.8E-01**
Dichlorobromomethane[C]	0	--	--	na	1.7E+02	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	--	--	na	**1.7E+02**
1,2-Dichloroethane[C]	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	--	--	--	--	--	--	--	--	na	**3.7E+02**
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	--	--	na	**2.1E+04**
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	2.9E+04	--	--	--	--	--	--	--	--	--	--	na	**2.9E+04**
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	8.5E+02	--	--	--	--	--	--	--	--	--	--	na	**8.5E+02**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	na	**1.5E+02**
1,3-Dichloropropene[C]	0	--	--	na	2.1E+02	--	--	na	2.1E+02	--	--	--	--	--	--	--	--	--	--	na	**2.1E+02**
Dieldrin[C]	0	2.4E-01	5.6E-02	na	5.4E-04	2.4E-01	8.5E-02	na	5.4E-04	--	--	--	--	--	--	--	--	**2.4E-01**	**8.6E-02**	na	**5.4E-04**
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	1.3E+05	--	--	--	--	--	--	--	--	--	--	na	**1.3E+05**
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	2.5E+03	--	--	--	--	--	--	--	--	--	--	na	**2.5E+03**
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	3.2E+06	--	--	--	--	--	--	--	--	--	--	na	**3.2E+06**
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	1.3E+04	--	--	--	--	--	--	--	--	--	--	na	**1.3E+04**
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	1.6E+04	--	--	--	--	--	--	--	--	--	--	na	**1.6E+04**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	8.2E+02	--	--	--	--	--	--	--	--	--	--	na	**8.2E+02**
2,4-Dinitrotoluene[C]	0	--	--	na	3.4E+01	--	--	na	3.4E+01	--	--	--	--	--	--	--	--	--	--	na	**3.4E+01**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	1.5E-07	--	--	--	--	--	--	--	--	--	--	na	**1.5E-07**
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	2.0E+00	--	--	--	--	--	--	--	--	--	--	na	**2.0E+00**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	8.5E-02	na	2.6E+02	--	--	--	--	--	--	--	--	**2.2E-01**	**8.5E-02**	na	**2.6E+02**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	8.5E-02	na	2.6E+02	--	--	--	--	--	--	--	--	**2.2E-01**	**8.5E-02**	na	**2.6E+02**
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.2E-01	8.5E-02	--	--	--	--	--	--	--	--	--	--	**2.2E-01**	**8.5E-02**	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	2.6E+02	--	--	--	--	--	--	--	--	--	--	na	**2.6E+02**
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	8.7E-02	5.5E-02	na	1.8E-01	--	--	--	--	--	--	--	--	**8.7E-02**	**5.5E-02**	na	**1.8E-01**
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	8.8E-01	--	--	--	--	--	--	--	--	--	--	na	**8.8E-01**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	6.2E+03	--	--	--	--	--	--	--	--	--	--	na	6.2E+03
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	4.1E+02	--	--	--	--	--	--	--	--	--	--	na	4.1E+02
Fluorene	0	--	--	na	5.3E+03	--	--	na	1.6E+04	--	--	--	--	--	--	--	--	--	--	na	1.6E+04
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.5E-02	na	--	--	--	--	--	--	--	--	--	--	1.5E-02	na	--
Heptachlor [c]	0	5.2E-01	3.8E-03	na	7.9E-04	5.2E-01	5.8E-03	na	7.9E-04	--	--	--	--	--	--	--	--	5.2E-01	5.8E-03	na	7.9E-04
Heptachlor Epoxide[c]	0	5.2E-01	3.8E-03	na	3.9E-04	5.2E-01	5.8E-03	na	3.9E-04	--	--	--	--	--	--	--	--	5.2E-01	5.8E-03	na	3.9E-04
Hexachlorobenzene[c]	0	--	--	na	2.9E-03	--	--	na	2.9E-03	--	--	--	--	--	--	--	--	--	--	na	2.9E-03
Hexachlorobutadiene[c]	0	--	--	na	1.8E+02	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	--	--	na	1.8E+02
Hexachlorocyclohexane Alpha-BHC[c]	0	--	--	na	4.9E-02	--	--	na	4.9E-02	--	--	--	--	--	--	--	--	--	--	na	4.9E-02
Hexachlorocyclohexane Beta-BHC[c]	0	--	--	na	1.7E-01	--	--	na	1.7E-01	--	--	--	--	--	--	--	--	--	--	na	1.7E-01
Hexachlorocyclohexane Gamma-BHC[c] (Lindane)	0	9.5E-01	na	na	1.8E+00	9.6E-01	--	na	1.8E+00	--	--	--	--	--	--	--	--	9.6E-01	--	na	1.8E+00
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	3.2E+03	--	--	--	--	--	--	--	--	--	--	na	3.2E+03
Hexachloroethane[c]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	--	--	na	3.3E+01
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	3.0E+00	na	--	--	--	--	--	--	--	--	--	--	3.0E+00	na	--
Indeno (1,2,3-cd) pyrene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone[c]	0	--	--	na	9.6E+03	--	--	na	9.6E+03	--	--	--	--	--	--	--	--	--	--	na	9.6E+03
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	2.9E+02	2.2E+01	na	--	2.9E+02	3.3E+01	na	--	--	--	--	--	--	--	--	--	2.9E+02	3.3E+01	na	--
Malathion	0	--	1.0E-01	na	--	--	1.5E-01	na	--	--	--	--	--	--	--	--	--	--	1.5E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.4E+00	1.2E+00	--	--	--	--	--	--	--	--	--	--	1.4E+00	1.2E+00	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	4.4E+03	--	--	--	--	--	--	--	--	--	--	na	4.4E+03
Methylene Chloride [c]	0	--	--	na	5.9E+03	--	--	na	5.9E+03	--	--	--	--	--	--	--	--	--	--	na	5.9E+03
Methoxychlor	0	--	3.0E-02	na	--	--	4.5E-02	na	--	--	--	--	--	--	--	--	--	--	4.5E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Nickel	0	3.3E+02	2.8E+01	na	4.6E+03	3.3E+02	4.2E+01	na	1.3E+04	--	--	--	--	--	--	--	--	3.3E+02	4.2E+01	na	1.3E+04
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	2.0E+03	--	--	--	--	--	--	--	--	--	--	na	2.0E+03
N-Nitrosodimethylamine[c]	0	--	--	na	3.0E+01	--	--	na	3.0E+01	--	--	--	--	--	--	--	--	--	--	na	3.0E+01
N-Nitrosodiphenylamine[c]	0	--	--	na	6.0E+01	--	--	na	6.0E+01	--	--	--	--	--	--	--	--	--	--	na	6.0E+01
N-Nitrosodi-n-propylamine[c]	0	--	--	na	5.1E+00	--	--	na	5.1E+00	--	--	--	--	--	--	--	--	--	--	na	5.1E+00
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.8E+01	1.0E+01	na	--	--	--	--	--	--	--	--	--	2.8E+01	1.0E+01	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	6.6E-02	2.0E-02	na	--	--	--	--	--	--	--	--	--	6.6E-02	2.0E-02	na	--
PCB Total[c]	0	--	1.4E-02	na	6.4E-04	--	2.1E-02	na	6.4E-04	--	--	--	--	--	--	--	--	--	2.1E-02	na	6.4E-04
Pentachlorophenol [c]	0	1.6E+01	7.8E+00	na	3.0E+01	1.6E+01	1.2E+01	na	3.0E+01	--	--	--	--	--	--	--	--	1.6E+01	1.2E+01	na	3.0E+01
Phenol	0	--	--	na	8.6E+05	--	--	na	2.5E+06	--	--	--	--	--	--	--	--	--	--	na	2.5E+06
Pyrene	0	--	--	na	4.0E+03	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	--	--	na	1.2E+04
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.0E+01	7.6E+00	na	1.2E+04	--	--	--	--	--	--	--	--	**2.0E+01**	**7.6E+00**	**na**	**1.2E+04**
Silver	0	1.1E+01	--	na	--	1.1E+01	--	na	--	--	--	--	--	--	--	--	--	**1.1E+01**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	4.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+01**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.3E+01**
Thallium	0	--	--	na	4.7E-01	--	--	na	1.4E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+00**
Toluene	0	--	--	na	6.0E+03	--	--	na	1.8E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E+04**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	7.4E-01	3.0E-04	na	2.8E-03	--	--	--	--	--	--	--	--	**7.4E-01**	**3.0E-04**	**na**	**2.8E-03**
Tributyltin	0	4.6E-01	7.2E-02	na	--	4.6E-01	1.1E-01	na	--	--	--	--	--	--	--	--	--	**4.6E-01**	**1.1E-01**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	2.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.1E+02**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+02**
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.0E+02**
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+01**
Zinc	0	2.1E+02	1.6E+02	na	2.6E+04	2.1E+02	2.4E+02	na	7.6E+04	--	--	--	--	--	--	--	--	**2.1E+02**	**2.4E+02**	**na**	**7.6E+04**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	1.9E+03
Arsenic	1.4E+02
Barium	na
Cadmium	1.4E+00
Chromium III	9.1E+01
Chromium VI	6.5E+00
Copper	1.0E+01
Iron	na
Lead	2.0E+01
Manganese	na
Mercury	5.7E-01
Nickel	2.5E+01
Selenium	4.5E+00
Silver	4.6E+00
Zinc	8.5E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Zion Crossroads WWTP Permit No.: VA0090743

Receiving Stream: South Anna River Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	35 mg/L
90% Temperature (Annual) =	24.5 deg C
90% Temperature (Wet season) =	15 deg C
90% Maximum pH =	7.4 SU
10% Maximum pH =	6.8 SU
Tier Designation (1 or 2) =	1
Public Water Supply (PWS) Y/N? =	n
Trout Present Y/N? =	n
Early Life Stages Present Y/N? =	y

Stream Flows

1Q10 (Annual) =	0.11 MGD
7Q10 (Annual) =	0.16 MGD
30Q10 (Annual) =	0.25 MGD
1Q10 (Wet season) =	4.08 MGD
30Q10 (Wet season)	11.37 MGD
30Q5 =	0.6 MGD
Harmonic Mean =	MGD

Mixing Information

Annual - 1Q10 Mix =	4.69 %
- 7Q10 Mix =	100 %
- 30Q10 Mix =	100 %
Wet Season - 1Q10 Mix =	100 %
- 30Q10 Mix =	100 %

Effluent Information

Mean Hardness (as CaCO3) =	201 mg/L
90% Temp (Annual) =	23 deg C
90% Temp (Wet season) =	15 deg C
90% Maximum pH =	8 SU
10% Maximum pH =	7.6 SU
Discharge Flow =	0.7 MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Basetine				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	9.9E+02	--	--	na	1.8E+03	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E+03**
Acrolein	0	--	--	na	9.3E+00	--	--	na	1.7E+01	--	--	--	--	--	--	--	--	--	--	**na**	**1.7E+01**
Acrylonitrile[c]	0	--	--	na	2.5E+00	--	--	na	2.5E+00	--	--	--	--	--	--	--	--	--	--	**na**	**2.5E+00**
Aldrin [c]	0	3.0E+00	--	na	5.0E-04	3.0E+00	--	na	5.0E-04	--	--	--	--	--	--	--	--	**3.0E+00**	--	**na**	**5.0E-04**
Ammonia-N (mg/l) (Yearly)	0	8.56E+00	1.91E+00	na	--	8.62E+00	2.59E+00	na	--	--	--	--	--	--	--	--	--	**8.62E+00**	**2.59E+00**	**na**	--
Ammonia-N (mg/l) (High Flow)	0	2.14E+01	4.52E+00	na	--	1.46E+02	7.80E+01	na	--	--	--	--	--	--	--	--	--	**1.46E+02**	**7.80E+01**	**na**	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	7.4E+04	--	--	--	--	--	--	--	--	--	--	**na**	**7.4E+04**
Antimony	0	--	--	na	6.4E+02	--	--	na	1.2E+03	--	--	--	--	--	--	--	--	--	--	**na**	**1.2E+03**
Arsenic	o	3.4E+02	1.5E+02	na	--	3.4E+02	1.8E+02	na	--	--	--	--	--	--	--	--	--	**3.4E+02**	**1.8E+02**	**na**	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Benzene [c]	0	--	--	na	5.1E+02	--	--	na	5.1E+02	--	--	--	--	--	--	--	--	--	--	**na**	**5.1E+02**
Benzidine[c]	0	--	--	na	2.0E-03	--	--	na	2.0E-03	--	--	--	--	--	--	--	--	--	--	**na**	**2.0E-03**
Benzo (a) anthracene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E-01**
Benzo (b) fluoranthene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E-01**
Benzo (k) fluoranthene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E-01**
Benzo (a) pyrene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E-01**
Bis2-Chloroethyl Ether [c]	0	--	--	na	5.3E+00	--	--	na	5.3E+00	--	--	--	--	--	--	--	--	--	--	**na**	**5.3E+00**
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	--	--	**na**	**1.2E+05**
Bis 2-Ethylhexyl Phthalate [c]	0	--	--	na	2.2E+01	--	--	na	2.2E+01	--	--	--	--	--	--	--	--	--	--	**na**	**2.2E+01**
Bromoform [c]	0	--	--	na	1.4E+03	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	--	--	**na**	**1.4E+03**
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	3.5E+03	--	--	--	--	--	--	--	--	--	--	**na**	**3.5E+03**
Cadmium	0	8.6E+00	1.7E+00	na	--	8.6E+00	2.1E+00	na	--	--	--	--	--	--	--	--	--	**8.6E+00**	**2.1E+00**	**na**	--
Carbon Tetrachloride [c]	0	--	--	na	1.6E+01	--	--	na	1.6E+01	--	--	--	--	--	--	--	--	--	--	**na**	**1.6E+01**
Chlordane [c]	0	2.4E+00	4.3E-03	na	8.1E-03	2.4E+00	5.3E-03	na	8.1E-03	--	--	--	--	--	--	--	--	**2.4E+00**	**5.3E-03**	**na**	**8.1E-03**
Chloride	0	8.6E+05	2.3E+05	na	--	8.7E+05	2.8E+05	na	--	--	--	--	--	--	--	--	--	**8.7E+05**	**2.8E+05**	**na**	--
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.4E+01	na	--	--	--	--	--	--	--	--	--	**1.9E+01**	**1.4E+01**	**na**	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	3.0E+03	--	--	--	--	--	--	--	--	--	--	**na**	**3.0E+03**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.3E+02**
Chloroform	0	--	--	na	1.1E+04	--	--	na	2.0E+04	--	--	--	--	--	--	--	--	--	--	**na**	**2.0E+04**
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	3.0E+03	--	--	--	--	--	--	--	--	--	--	**na**	**3.0E+03**
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	2.8E+02	--	--	--	--	--	--	--	--	--	--	**na**	**2.8E+02**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.4E-02	5.0E-02	na	--	--	--	--	--	--	--	--	--	**8.4E-02**	**5.0E-02**	**na**	**--**
Chromium III	0	1.0E+03	1.1E+02	na	--	1.0E+03	1.4E+02	na	--	--	--	--	--	--	--	--	--	**1.0E+03**	**1.4E+02**	**na**	**--**
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.4E+01	na	--	--	--	--	--	--	--	--	--	**1.6E+01**	**1.4E+01**	**na**	**--**
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	**--**
Chrysene [C]	0	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E-02**
Copper	0	2.6E+01	1.4E+01	na	--	2.6E+01	1.7E+01	na	--	--	--	--	--	--	--	--	--	**2.6E+01**	**1.7E+01**	**na**	**--**
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.2E+01	6.4E+00	na	3.0E+04	--	--	--	--	--	--	--	--	**2.2E+01**	**6.4E+00**	**na**	**3.0E+04**
DDD [C]	0	--	--	na	3.1E-03	--	--	na	3.1E-03	--	--	--	--	--	--	--	--	--	--	**na**	**3.1E-03**
DDE [C]	0	--	--	na	2.2E-03	--	--	na	2.2E-03	--	--	--	--	--	--	--	--	--	--	**na**	**2.2E-03**
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.1E+00	1.2E-03	na	2.2E-03	--	--	--	--	--	--	--	--	**1.1E+00**	**1.2E-03**	**na**	**2.2E-03**
Demeton	0	--	1.0E-01	na	--	--	1.2E-01	na	--	--	--	--	--	--	--	--	--	--	**1.2E-01**	**na**	**--**
Diazinon	0	1.7E-01	1.7E-01	na	--	1.7E-01	2.1E-01	na	--	--	--	--	--	--	--	--	--	**1.7E-01**	**2.1E-01**	**na**	**--**
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E-01**
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	2.4E+03	--	--	--	--	--	--	--	--	--	--	**na**	**2.4E+03**
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	1.8E+03	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E+03**
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	3.5E+02	--	--	--	--	--	--	--	--	--	--	**na**	**3.5E+02**
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	2.8E-01	--	--	--	--	--	--	--	--	--	--	**na**	**2.8E-01**
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.7E+02**
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	--	--	--	--	--	--	--	--	**na**	**3.7E+02**
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	1.3E+04	--	--	--	--	--	--	--	--	--	--	**na**	**1.3E+04**
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.9E+04	--	--	--	--	--	--	--	--	--	--	**na**	**1.9E+04**
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	5.4E+02	--	--	--	--	--	--	--	--	--	--	**na**	**5.4E+02**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	**--**
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.5E+02**
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	2.1E+02	--	--	--	--	--	--	--	--	--	--	**na**	**2.1E+02**
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	2.4E-01	6.9E-02	na	5.4E-04	--	--	--	--	--	--	--	--	**2.4E-01**	**6.9E-02**	**na**	**5.4E-04**
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	8.2E+04	--	--	--	--	--	--	--	--	--	--	**na**	**8.2E+04**
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	--	--	**na**	**1.6E+03**
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	2.0E+06	--	--	--	--	--	--	--	--	--	--	**na**	**2.0E+06**
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	8.4E+03	--	--	--	--	--	--	--	--	--	--	**na**	**8.4E+03**
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	9.8E+03	--	--	--	--	--	--	--	--	--	--	**na**	**9.8E+03**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	5.2E+02	--	--	--	--	--	--	--	--	--	--	**na**	**5.2E+02**
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	3.4E+01	--	--	--	--	--	--	--	--	--	--	**na**	**3.4E+01**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	9.5E-08	--	--	--	--	--	--	--	--	--	--	**na**	**9.5E-08**
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	2.0E+00	--	--	--	--	--	--	--	--	--	--	**na**	**2.0E+00**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	6.9E-02	na	1.7E+02	--	--	--	--	--	--	--	--	**2.2E-01**	**6.9E-02**	**na**	**1.7E+02**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	6.9E-02	na	1.7E+02	--	--	--	--	--	--	--	--	**2.2E-01**	**6.9E-02**	**na**	**1.7E+02**
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.2E-01	6.9E-02	--	--	--	--	--	--	--	--	--	--	**2.2E-01**	**6.9E-02**	**--**	**--**
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.7E+02**
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	8.7E-02	4.4E-02	na	1.1E-01	--	--	--	--	--	--	--	--	**8.7E-02**	**4.4E-02**	**na**	**1.1E-01**
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	5.6E-01	--	--	--	--	--	--	--	--	--	--	**na**	**5.6E-01**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	3.9E+03	--	--	--	--	--	--	--	--	--	--	na	3.9E+03
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	2.6E+02	--	--	--	--	--	--	--	--	--	--	na	2.6E+02
Fluorene	0	--	--	na	5.3E+03	--	--	na	9.8E+03	--	--	--	--	--	--	--	--	--	--	na	9.8E+03
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.2E-02	na	--	--	--	--	--	--	--	--	--	--	1.2E-02	na	--
Heptachlor [C]	0	5.2E-01	3.8E-03	na	7.9E-04	5.2E-01	4.7E-03	na	7.9E-04	--	--	--	--	--	--	--	--	5.2E-01	4.7E-03	na	7.9E-04
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	3.9E-04	5.2E-01	4.7E-03	na	3.9E-04	--	--	--	--	--	--	--	--	5.2E-01	4.7E-03	na	3.9E-04
Hexachlorobenzene[C]	0	--	--	na	2.9E-03	--	--	na	2.9E-03	--	--	--	--	--	--	--	--	--	--	na	2.9E-03
Hexachlorobutadiene[C]	0	--	--	na	1.8E+02	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	--	--	na	1.8E+02
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	4.9E-02	--	--	na	4.9E-02	--	--	--	--	--	--	--	--	--	--	na	4.9E-02
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	1.7E-01	--	--	na	1.7E-01	--	--	--	--	--	--	--	--	--	--	na	1.7E-01
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	1.8E+00	9.6E-01	--	na	1.8E+00	--	--	--	--	--	--	--	--	9.6E-01	--	na	1.8E+00
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	2.0E+03	--	--	--	--	--	--	--	--	--	--	na	2.0E+03
Hexachloroethane[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	--	--	na	3.3E+01
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.5E+00	na	--	--	--	--	--	--	--	--	--	--	2.5E+00	na	--
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone[C]	0	--	--	na	9.6E+03	--	--	na	9.6E+03	--	--	--	--	--	--	--	--	--	--	na	9.6E+03
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	2.9E+02	2.7E+01	na	--	2.9E+02	3.3E+01	na	--	--	--	--	--	--	--	--	--	2.9E+02	3.3E+01	na	--
Malathion	0	--	1.0E-01	na	--	--	1.2E-01	na	--	--	--	--	--	--	--	--	--	--	1.2E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.4E+00	9.5E-01	--	--	--	--	--	--	--	--	--	--	1.4E+00	9.5E-01	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	2.8E+03	--	--	--	--	--	--	--	--	--	--	na	2.8E+03
Methylene Chloride [C]	0	--	--	na	5.9E+03	--	--	na	5.9E+03	--	--	--	--	--	--	--	--	--	--	na	5.9E+03
Methoxychlor	0	--	3.0E-02	na	--	--	3.7E-02	na	--	--	--	--	--	--	--	--	--	--	3.7E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Nickel	0	3.3E+02	3.2E+01	na	4.6E+03	3.3E+02	3.9E+01	na	8.5E+03	--	--	--	--	--	--	--	--	3.3E+02	3.9E+01	na	8.5E+03
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	1.3E+03	--	--	--	--	--	--	--	--	--	--	na	1.3E+03
N-Nitrosodimethylamine[C]	0	--	--	na	3.0E+01	--	--	na	3.0E+01	--	--	--	--	--	--	--	--	--	--	na	3.0E+01
N-Nitrosodiphenylamine[C]	0	--	--	na	6.0E+01	--	--	na	6.0E+01	--	--	--	--	--	--	--	--	--	--	na	6.0E+01
N-Nitrosodi-n-propylamine[C]	0	--	--	na	5.1E+00	--	--	na	5.1E+00	--	--	--	--	--	--	--	--	--	--	na	5.1E+00
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.8E+01	8.1E+00	na	--	--	--	--	--	--	--	--	--	2.8E+01	8.1E+00	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	6.5E-02	1.6E-02	na	--	--	--	--	--	--	--	--	--	6.5E-02	1.6E-02	na	--
PCB Total[C]	0	--	1.4E-02	na	6.4E-04	--	1.7E-02	na	6.4E-04	--	--	--	--	--	--	--	--	--	1.7E-02	na	6.4E-04
Pentachlorophenol [C]	0	1.6E+01	9.1E+00	na	3.0E+01	1.6E+01	1.1E+01	na	3.0E+01	--	--	--	--	--	--	--	--	1.6E+01	1.1E+01	na	3.0E+01
Phenol	0	--	--	na	8.6E+05	--	--	na	1.6E+06	--	--	--	--	--	--	--	--	--	--	na	1.6E+06
Pyrene	0	--	--	na	4.0E+03	--	--	na	7.4E+03	--	--	--	--	--	--	--	--	--	--	na	7.4E+03
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.0E+01	6.1E+00	na	7.8E+03	--	--	--	--	--	--	--	--	**2.0E+01**	**6.1E+00**	**na**	**7.8E+03**
Silver	0	1.1E+01	--	na	--	1.1E+01	--	na	--	--	--	--	--	--	--	--	--	**1.1E+01**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	4.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+01**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.3E+01**
Thallium	0	--	--	na	4.7E-01	--	--	na	8.7E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.7E-01**
Toluene	0	--	--	na	6.0E+03	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+04**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	7.4E-01	2.5E-04	na	2.8E-03	--	--	--	--	--	--	--	--	**7.4E-01**	**2.5E-04**	**na**	**2.8E-03**
Tributyltin	0	4.6E-01	7.2E-02	na	--	4.6E-01	8.8E-02	na	--	--	--	--	--	--	--	--	--	**4.6E-01**	**8.8E-02**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E+02**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+02**
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.0E+02**
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+01**
Zinc	0	2.1E+02	1.9E+02	na	2.6E+04	2.1E+02	2.3E+02	na	4.8E+04	--	--	--	--	--	--	--	--	**2.1E+02**	**2.3E+02**	**na**	**4.8E+04**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	1.2E+03
Arsenic	1.1E+02
Barium	na
Cadmium	1.3E+00
Chromium III	8.4E+01
Chromium VI	6.4E+00
Copper	1.0E+01
Iron	na
Lead	2.0E+01
Manganese	na
Mercury	5.6E-01
Nickel	2.3E+01
Selenium	3.7E+00
Silver	4.6E+00
Zinc	8.5E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

Mixing Zone Predictions for Zion Crossroads 004

Effluent Flow = 0.311 MGD
Stream 7Q10 = 0.16 MGD
Stream 30Q10 = 0.25 MGD
Stream 1Q10 = 0.11 MGD
Stream slope = 10 ft/ft
Stream width = 60 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = .0074 ft
Length = 204038.37 ft
Velocity = 1.6326 ft/sec
Residence Time = 1.4465 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = .0083 ft
Length = 186947.02 ft
Velocity = 1.7509 ft/sec
Residence Time = 1.2358 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = .007 ft
Length = 215812.97 ft
Velocity = 1.561 ft/sec
Residence Time = 38.4045 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 2.6% of the 1Q10 is used.

Mixing Zone Predictions for Zion Crossroads 004

Effluent Flow = 0.7 MGD
Stream 7Q10 = 0.16 MGD
Stream 30Q10 = 0.25 MGD
Stream 1Q10 = 0.11 MGD
Stream slope = 10 ft/ft
Stream width = 60 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = .0107 ft
Length = 150978.24 ft
Velocity = 2.0771 ft/sec
Residence Time = .8413 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = .0113 ft
Length = 143647.8 ft
Velocity = 2.1615 ft/sec
Residence Time = .7692 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = .0103 ft
Length = 155571.03 ft
Velocity = 2.0279 ft/sec
Residence Time = 21.3094 hours

Recommendation:

A complete mix assumption is appropriate for this situation providing no more than 4.69% of the 1Q10 is used.

Zion Crossroads Hardness Values

Permit #:VA0090743

Due	CONC AVG (mg/L)
10-Apr-12	79
10-Jan-12	204
10-Oct-11	209
10-Jul-11	183
10-Apr-11	174
10-Jan-11	181
10-Oct-10	216
10-Jul-10	260
10-Apr-10	240
10-Jul-09	260
10-Apr-09	200
Average	**201**

Attachment 9

Hardness Values at Station 8-SAR089.35

Collection Date Time	Hardness Value (mg/L)
10/23/2002 11:00	53.1
03/24/2003 12:45	28.3
04/08/2003 11:55	24.6
05/13/2003 10:42	34.6
Average Hardness	**35**

4/26/2012 2:42:07 PM - Camp Creek Impoundment

Facility = Zion Crossroads WWTP--0.1 MGD
Chemical = Ammonia
Chronic averaging period = 30
WLAa = 2.1
WLAc = 0.352
Q.L. = 0.2
# samples/mo. = 4
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 0.710219872882541
Average Weekly limit = 0.710219872882542
Average Monthly LImit = 0.485595595265433

The data are:

9

Attachment 10

4/26/2012 2:41:07 PM – Camp Creek Impoundment

Facility = Zion Crossroads WWTP--0.311 MGD
Chemical = Ammonia
Chronic averaging period = 30
WLAa = 2.1
WLAc = 0.352
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 0.710219872882541
Average Weekly limit = 0.519485851579103
Average Monthly LImit = 0.386949060222047

The data are:

4/26/2012 2:29:12 PM – Camp Creek Impoundment

Facility = Zion Crossroads WWTP--0.7 MGD
Chemical = Ammonia
Chronic averaging period = 30
WLAa = 2.1
WLAc = 0.352
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 0.710219872882541
Average Weekly limit = 0.519485851579103
Average Monthly LImit = 0.386949060222047

The data are:

9

Camp Creek Impoundment

4/26/2012 4:39:56 PM

Facility = Zion Crossroads WWTP
Chemical = Copper
Chronic averaging period = 30
WLAa = 6.5
WLAc = 4.1
Q.L. = 2
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 13
Expected Value = 16.4213
Variance = 437.041
C.V. = 1.273069
97th percentile daily values = 64.2743
97th percentile 4 day average = 41.4947
97th percentile 30 day average= 23.6007
< Q.L. = 0
Model used = lognormal

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 6.5
Average Weekly limit = 6.5
Average Monthly LImit = 6.5

The data are:

50
6
50
7
3
5
5
7
15
4
28
26
5

7/3/2012 10:41:50 AM

Facility = Zion Crossroads WWTP (Camp Creek Impoundment)
Chemical = Zinc
Chronic averaging period = 4
WLAa = 53
WLAc = 53
Q.L. = 20
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 13
Expected Value = 191.038
Variance = 8336.15
C.V. = 0.477928
97th percentile daily values = 404.549
97th percentile 4 day average = 289.446
97th percentile 30 day average= 222.393
< Q.L. = 0
Model used = lognormal

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 53
Average Weekly limit = 53
Average Monthly LImit = 53

The data are:

64
106
148
162
150
191
170
210
190
310
420
180
160

7/11/2012 4:02:25 PM

Facility = Zion Crossroads WWTP (0.311 SAR) OwoPsils 002/003
Chemical = Ammonia
Chronic averaging period = 30
WLAa = 8.7
WLAc = 3.4
Q.L. = .2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 6.86007831761546
Average Weekly limit = 5.01776106638907
Average Monthly LImit = 3.73757614987205

The data are:

9

7/11/2012 4:03:54 PM

outfalls 002/003

Facility = Zion Crossroads WWTP (0.7 SAR)
Chemical = Ammonia
Chronic averaging period = 30
WLAa = 8.7
WLAc = 2.4
Q.L. = .2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 4.84240822419915
Average Weekly limit = 3.54194898803934
Average Monthly LImit = 2.63828904696851

The data are:

9

7/11/2012 4:29:24 PM

Facility = Zion Crossroads WWTP (0.311 SAR) Outfalls 002/003
Chemical = TRC
Chronic averaging period = 4
WLAa = 19
WLAc = 16
Q.L. = 100
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 200
Variance = 14400
C.V. = 0.6
97th percentile daily values = 486.683
97th percentile 4 day average = 332.758
97th percentile 30 day average= 241.210
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 19
Average Weekly limit = 11.3335966321422
Average Monthly LImit = 9.41680211348591

The data are:

200

7/11/2012 4:25:37 PM

Facility = Zion Crossroads WWTP (0.7 SAR) 002/003
Chemical = TRC
Chronic averaging period = 4
WLAa = 19
WLAc = 13
Q.L. = 100
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 200
Variance = 14400
C.V. = 0.6
97th percentile daily values = 486.683
97th percentile 4 day average = 332.758
97th percentile 30 day average= 241.210
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 19
Average Weekly limit = 11.3335966321422
Average Monthly LImit = 9.41680211348591

The data are:

200

8/27/2012 1:16:15 PM

Facility = Zion Xroads 002/003 0.311 MGD
Chemical = Copper
Chronic averaging period = 4
WLAa = 26
WLAc = 18
Q.L. = 2
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 15
Expected Value = 14.4085
Variance = 383.403
C.V. = 1.358967
97th percentile daily values = 60.7312
97th percentile 4 day average = 37.9752
97th percentile 30 day average= 21.1329
< Q.L. = 1
Model used = delta lognormal

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 26
Average Weekly limit = 26
Average Monthly LImit = 26

The data are:

0
3
50
5
6
50
7
3
5
5
7
15
4
28
26

8/27/2012 1:17:46 PM

Facility = Zion Xroad 002/003 0.7 MGD
Chemical = Copper
Chronic averaging period = 4
WLAa = 26
WLAc = 17
Q.L. = 2
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 15
Expected Value = 14.4085
Variance = 383.403
C.V. = 1.358967
97th percentile daily values = 60.7312
97th percentile 4 day average = 37.9752
97th percentile 30 day average= 21.1329
< Q.L. = 1
Model used = delta lognormal

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 26
Average Weekly limit = 26
Average Monthly LImit = 26

The data are:

0
3
50
5
6
50
7
3
5
5
7
15
4
28
26

8/27/2012 1:33:15 PM

Facility = Zion Xroads 002/003 0.311 MGD
Chemical = Zinc
Chronic averaging period = 4
WLAa = 210
WLAc = 240
Q.L. = 20
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 13
Expected Value = 163.115
Variance = 8725.17
C.V. = 0.572652
97th percentile daily values = 385.444
97th percentile 4 day average = 265.886
97th percentile 30 day average= 195.194
< Q.L. = 0
Model used = lognormal

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 210
Average Weekly limit = 210
Average Monthly LImit = 210

The data are:

73
57
70
106
148
162
150
191
170
210
420
180
160

8/27/2012 1:34:11 PM

Facility = Zion Xroads 002/003 0.7 MGD
Chemical = Zinc
Chronic averaging period = 4
WLAa = 210
WLAc = 230
Q.L. = 20
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 13
Expected Value = 163.115
Variance = 8725.17
C.V. = 0.572652
97th percentile daily values = 385.444
97th percentile 4 day average = 265.886
97th percentile 30 day average= 195.194
< Q.L. = 0
Model used = lognormal

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 210
Average Weekly limit = 210
Average Monthly LImit = 210

The data are:

73
57
70
106
148
162
150
191
170
210
420
180
160

8/23/2012 11:42:12 AM

Facility = Zion Xroads 004 0.311 MGD
Chemical = Ammonia
Chronic averaging period = 30
WLAa = 8.7
WLAc = 3.9
Q.L. = .2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 7.86891336432361
Average Weekly limit = 5.75566710556393
Average Monthly LImit = 4.28721970132382

The data are:

9

8/27/2012 1:44:59 PM

Facility = Zion Xroads 004 0.7 MGD
Chemical = Ammonia
Chronic averaging period = 30
WLAa = 8.6
WLAc = 2.6
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 5.24594224288241
Average Weekly limit = 3.83711140370929
Average Monthly LImit = 2.85814646754921

The data are:

9

8/23/2012 12:25:37 PM

Facility = Zion Xroads 004 0.311 MGD
Chemical = TRC
Chronic averaging period = 4
WLAa = 19
WLAc = 17
Q.L. = 100
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 200
Variance = 14400
C.V. = 0.6
97th percentile daily values = 486.683
97th percentile 4 day average = 332.758
97th percentile 30 day average= 241.210
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 19
Average Weekly limit = 11.3335966321422
Average Monthly LImit = 9.41680211348591

The data are:

200

8/23/2012 12:24:48 PM

Facility = Zion Crossroads 004 0.7 MGD
Chemical = TRC
Chronic averaging period = 4
WLAa = 19
WLAc = 14
Q.L. = 100
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 200
Variance = 14400
C.V. = 0.6
97th percentile daily values = 486.683
97th percentile 4 day average = 332.758
97th percentile 30 day average= 241.210
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 19
Average Weekly limit = 11.3335966321422
Average Monthly LImit = 9.41680211348591

The data are:

200

8/27/2012 1:18:55 PM

Facility = Zion Xroads 004 0.311 MGD
Chemical = Copper
Chronic averaging period = 4
WLAa = 26
WLAc = 19
Q.L. = 2
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 15
Expected Value = 14.4085
Variance = 383.403
C.V. = 1.358967
97th percentile daily values = 60.7312
97th percentile 4 day average = 37.9752
97th percentile 30 day average= 21.1329
< Q.L. = 1
Model used = delta lognormal

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 26
Average Weekly limit = 26
Average Monthly LImit = 26

The data are:

0
3
50
5
6
50
7
3
5
5
7
15
4
28
26

9/4/2012 11:41:08 AM

Facility = Zion Xroads 004 0.7 MGD
Chemical = Copper
Chronic averaging period = 4
WLAa = 26
WLAc = 17
Q.L. = 2
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 15
Expected Value = 14.4085
Variance = 383.403
C.V. = 1.358967
97th percentile daily values = 60.7312
97th percentile 4 day average = 37.9752
97th percentile 30 day average= 21.1329
< Q.L. = 1
Model used = delta lognormal

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 26
Average Weekly limit = 26
Average Monthly LImit = 26

The data are:

0
3
50
5
6
50
7
3
5
5
7
15
4
28
26

9/4/2012 11:19:19 AM

Facility = Zion Xroads 004 0.311 MGD
Chemical = Zinc
Chronic averaging period = 4
WLAa = 210
WLAc = 240
Q.L. = 20
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 13
Expected Value = 163.115
Variance = 8725.17
C.V. = 0.572652
97th percentile daily values = 385.444
97th percentile 4 day average = 265.886
97th percentile 30 day average= 195.194
< Q.L. = 0
Model used = lognormal

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 210
Average Weekly limit = 210
Average Monthly LImit = 210

The data are:

73
57
70
106
148
162
150
191
170
210
420
180
160

8/27/2012 1:26:36 PM

Facility = Zion Xroads 004 0.7 MGD
Chemical = Zinc
Chronic averaging period = 4
WLAa = 210
WLAc = 230
Q.L. = 20
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 13
Expected Value = 163.115
Variance = 8725.17
C.V. = 0.572652
97th percentile daily values = 385.444
97th percentile 4 day average = 265.886
97th percentile 30 day average= 195.194
< Q.L. = 0
Model used = lognormal

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 210
Average Weekly limit = 210
Average Monthly LImit = 210

The data are:

73
57
70
106
148
162
150
191
170
210
420
180
160

```
"Model Run For U:\Water Permits\VPDES Program\Facility Archive\Zion Crossroads WWTP
(VA0090743)\2012 Reissuance\Permit Drafting Documents\Regional Model. DO 6.mod On
9/13/2012 1:25:24 PM"

"Model is for SOUTH ANNA RIVER."
"Model starts at the ZION CROSSROADS WWTP discharge."

"Background Data"
"7Q10",  "cBOD5",  "TKN",     "DO",      "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
.1312,   2,        1,        7.469,    24.5

"Discharge/Tributary Input Data for Segment 1"
"Flow",  "cBOD5",  "TKN",     "DO",      "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
.7,      10,       3,        ,6,       24.5

"Hydraulic Information for Segment 1"
"Length","Width",  "Depth",  "Velocity"
"(mi)",  "(ft)",   "(ft)",   "(ft/sec)"
1.21,    50,       .14,      .183

"Initial Mix Values for Segment 1"
"Flow",  "DO",     "cBOD",   "nBOD",   "DOSat",  "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
.8312,   6.232,    21.844,   0,        8.304,    24.5

"Rate Constants for Segment 1. - (All units Per Day)"
"k1",  "k1@T", "k2",   "k2@T", "kn",   "kn@T", "BD",   "BD@T"
1.4,   1.721,  14.876, 16.551, .35,    .495,   0,      0

"Output for Segment 1"
"Segment starts at ZION CROSSROADS WWTP"
"Total", "Segm."
"Dist.", "Dist.", "DO",     "cBOD",   "nBOD"
"(mi)",  "(mi)",  "(mg/l)", "(mg/l)", "(mg/l)"
0,       0,       6.232,    21.844,   0
.1,      .1,      6.177,    20.624,   0
.2,      .2,      6.197,    19.472,   0
.3,      .3,      6.258,    18.384,   0
.4,      .4,      6.34,     17.357,   0
.5,      .5,      6.431,    16.387,   0
.6,      .6,      6.525,    15.472,   0
.7,      .7,      6.618,    14.608,   0
.8,      .8,      6.709,    13.792,   0
.9,      .9,      6.796,    13.022,   0
1,       1,       6.879,    12.295,   0
1.1,     1.1,     6.958,    11.608,   0
1.2,     1.2,     7.033,    10.96,    0
1.21,    1.21,    7.04,     10.897,   0


"END OF FILE"
```


Attachment 11

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF VIRGINIA
CHARLOTTESVILLE DIVISION

CLERK'S OFFICE U.S. DIST. COURT
AT LYNCHBURG, VA
FILED
NOV 05 2012
JULIA C. DUDLEY, CLERK
BY: DEPUTY CLERK

THE HISTORIC GREEN SPRINGS INC.; REGINALD MURPHY AND JANE STUART MURPHY,	
Plaintiffs,	Civil Action No. 3:09-CV-79 Judge Norman K. Moon
v.	
LOUISA COUNTY WATER AUTHORITY	
Defendant.	

CONSENT DECREE

I. BACKGROUND

A. On November 30, 2009, Plaintiffs, The Historic Green Springs, Inc., Reginald Murphy and Jane Stuart Murphy (collectively "HGSI" or "Plaintiffs"), commenced an action against the Louisa County Water Authority ("LCWA") pursuant to Section 505 of the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 and the Water Quality Act of 1987 ("CWA"), 33 U.S.C. § 1365. HGSI and LCWA are hereinafter referred to individually as a Party and collectively as the "Parties."

B. HGSI's complaint ("Complaint") asserts that LCWA is liable pursuant to the above-referenced statute for alleged violations of the Virginia Pollutant Elimination Discharge System ("VPDES") permit issued to LCWA on December 4, 2008 for the Zion Crossroads Wastewater Treatment Plant ("Plant") by the Virginia State Water Control Board ("SWCB"). HGSI has appealed that permit and the appeal is currently pending in the Circuit Court of Louisa County.

Attachment 12

C. LCWA denies the allegations set forth in HGSI's Complaint and denies that it is liable under the CWA.

D. The Virginia Department of Environmental Quality (DEQ) has asserted many of the same violations alleged by HGSI in the form of Notices of Violation ("NOVs") issued to LCWA beginning in 2009. Both HGSI and DEQ contended that the violations alleged in their respective Complaint and NOVs were the result of the Plant's inadequate design and LCWA's poor operation, maintenance, and record keeping practices.

E. On February 4, 2011, the SWCB issued to LCWA an Order by Consent ("Order"), which included a schedule of compliance requiring LCWA to submit to DEQ a plan of action and schedule to ensure consistent compliance with the effluent limits and requirements of the VPDES Permit. LCWA's plan of action and schedule were subsequently submitted and approved by DEQ. The approved plan includes, among other measures, capital improvements to the Plant to address deficiencies in its original design as well as enhancements to LCWA's operation, maintenance and record keeping practices, many of which were implemented by LCWA before the Order was entered.

F. The Order, together with another order by consent issued to LCWA on February 4, 2011 for LCWA's Regional Wastewater Treatment Plant, require LCWA to spend no less than a total of $172,368.00 on a Supplemental Environmental Project (SEP) consisting of the design and construction of the facilities needed to provide effluent from the Plant to the adjacent Spring Creek Golf Course and residential development for reuse by the Development as irrigation water. The orders provide that LCWA may submit an alternate SEP proposal to DEQ for approval if the SEP described in the orders cannot be completed.

G. LCWA contends that the measures implemented by it before and since the Order was issued have corrected the deficiencies alleged by HGSI and that it is now able to comply with the currently effective effluent limitations and requirements in the VPDES permit.

H. Following an extensive evaluation of enhanced zinc removal options and other zinc control measures, LCWA has concluded that the VPDES Permit's effluent limitations for total recoverable zinc are unattainable and that the Plant will not be able to comply with the zinc limits when they take effect on December 4, 2012. Further, following review and evaluation of regulatory alternatives that would support less stringent zinc limits, and in consultation with DEQ, LCWA has also concluded that less stringent zinc limits are not a viable option so long as Camp Creek, with its small flow and limited assimilative capacity, remains the Plant's authorized discharge location. Accordingly, the Parties have agreed to a mutually acceptable solution, which involves relocating the authorized discharge location from Camp Creek to the South Anna River where greater flow and assimilative capacity will provide for less stringent zinc limits that can be consistently achieved with the Plant's treatment processes. LCWA certifies that it has requested DEQ to modify the VPDES Permit to authorize relocation of the Plant's discharge from Camp Creek to the South Anna River and that such request is pending before DEQ.

I. The Parties also agree that their mutual interests will be served by relocating the Plant's discharge and Reuse of the Plant's effluent to the maximum extent possible in accordance with the current comprehensive plan of Louisa County and to the extent permitted by law.

J. Now that LCWA has implemented measures to address the bases for the claims alleged in the Complaint and the Parties have agreed upon a course of action to address HGSI's concerns regarding the Plant's continued discharge to Camp Creek, the Parties have agreed to

memorialize their respective commitments, including their commitment to use their reasonable best efforts to communicate, cooperate, and work together to avoid disputes in the future.

K. The Parties agree, without adjudication of facts or law, that settlement of this matter, any potential future zinc limit-related claims that HGSI might assert against LCWA with respect to the Plant, and the pending permit appeal in accordance with the terms of this Consent Decree is fair, reasonable and in the public interest. The Parties have agreed to entry of this Consent Decree without trial of any issues, and the Parties stipulate that, in order to resolve the claims set forth in the Complaint, potential future zinc limit-related claims by HGSI against LCWA, and the pending permit appeal, this Consent Decree should be entered.

L. Settlement and entry of this Consent Decree does not constitute an admission of liability by LCWA, nor does it constitute an admission or acknowledgement by LCWA that discharges from the Plant have posed or will pose a threat to human health or Camp Creek.

NOW, THEREFORE, it is hereby Adjudged, Ordered, and Decreed, as follows:

II. JURISDICTION AND VENUE

1. This Court has jurisdiction over the subject matter of this action, and over the Parties hereto, pursuant to Section 505 of the CWA, 33 U.S.C. § 1365. Venue is proper in this District pursuant to 33 U.S.C. § 1365, and 28 U.S.C. §§ 1391 and 1395(a).

III. APPLICATION

2. The provisions of this Consent Decree shall apply to, and be binding upon, the Parties and their officers, directors, employees, agents, successors, and assigns.

IV. DEFINITIONS

3. Unless otherwise defined herein, the terms used in this Consent Decree shall have the meaning given to those terms in the Clean Water Act, 33 U.S.C. §§ 1251 *et seq.*, and regulations promulgated thereunder.

4. The following terms used in this Consent Decree shall be defined as follows:

(a) "Date of Entry" shall mean the date this Consent Decree is approved and signed by a United States District Judge for the Western District of Virginia.

(b) "Day" shall mean a calendar day. In computing any period of time under this Consent Decree, where the last Day would fall on a Saturday, Sunday, or Federal or Commonwealth holiday, the period shall run until the close of business of the next working Day.

(c) "Order by Consent" or "Order" means the Order by Consent issued to LCWA for the Plant on February 4, 2011 and any future new or modified orders that may be issued for the Plant by the SWCB pursuant to its authority at Section 62.1- 44.15 of the Code of Virginia.

(d) "Reuse" means any legally authorized and permitted reuse of wastewater for irrigation and other beneficial uses that is not a point source discharge of a pollutant to waters of the United States.

(e) "Third Party" or "Third Parties" mean any person or entity that is not affiliated with or under the control of either LCWA or the County of Louisa (County), including any officer, director, employee, agent or assign of LCWA or the County, or any department or agency of the County.

(f) "VPDES Permit" means Virginia Pollutant Discharge Elimination System permit VA0090743 issued to LCWA on December 4, 2008 for the Zion Crossroads Wastewater Treatment Plant, and each modification or re-issuance thereof.

(g) "VPDES-Permitted Wastewater Discharges" means the point source discharge of a pollutant to waters of the United States for which a VPDES permit as has been issued by the SWCB.

V. REMEDIAL MEASURES

5. With the exception of the effluent limitations for total recoverable zinc, LCWA shall comply with the effluent limitations and all other requirements of the VPDES Permit.

6. Without limiting its right to engage in Reuse of the Plant's effluent, LCWA shall eliminate all VPDES-Permitted Wastewater Discharges from the Plant to Camp Creek within four (4) years of the Date of Entry of this Consent Decree through relocation of the discharge to the South Anna River at a discharge point to be approved by DEQ and the SWCB. Relocation of the discharge will be accomplished through construction and operation of a pipeline to the South Anna River. The foregoing notwithstanding, LCWA may propose to HGSI an alternative to the pipeline to the South Anna River as the means by which it will eliminate all VPDES-Permitted Wastewater Discharges from the Plant to Camp Creek. Any such proposal must be in writing and consistent with the VPDES Permit. Plaintiffs agree to provide LCWA with written acceptance or rejection of the proposal within thirty (30) days of receiving the proposal. Following Plaintiffs' acceptance of LCWA's proposal, the Parties will jointly move for modification of this Consent Decree to substitute the accepted alternative to the pipeline to the South Anna River. Such modification must be approved by the Court before it will be deemed effective.

VI. PENDING AND FUTURE OBJECTIONS AND APPEALS

7. Within thirty (30) days of the Date of Entry of this Consent Decree, Plaintiffs shall take all steps necessary to withdraw with prejudice their pending appeal of the VPDES permit issued for the Plant on December 4, 2008.

8. Plaintiffs agree to not object to or appeal reissuance or modification of the VPDES Permit or to a new or modified Order by Consent during the term of this Consent Decree unless the permit reissuance or modification or new or modified order raises new matters that directly affect Camp Creek and have not been previously regulated or addressed by the VPDES Permit.

VII. INFORMATION SHARING AND REPORTING

9. Beginning with the first Plant discharge monitoring report ("DMR") submitted to DEQ after the Date of Entry of this Consent Decree, LCWA shall provide HGSI with copies of all DMRs and other Plant reports submitted to DEQ at the time they are submitted.

10. Beginning January 10, 2013 and every six (6) months thereafter, LCWA shall provide the HGSI with pipeline construction progress reports unless LCWA is required by DEQ to submit such progress reports, in which case LCWA shall provide the HGSI with copies of the progress reports submitted to DEQ at the time they are submitted.

VIII. STIPULATED PAYMENTS

11. LCWA shall make a stipulated payment to the South Anna Monitoring Project ("Project") for monitoring and restoration of Camp Creek for each failure by LCWA to comply with this Consent Decree as follows, unless excused by the *Force Majeure* (Section IX) or Dispute Resolution (Section X) provisions of this Consent Decree or offset by a civil charge assessed by DEQ as set forth in Paragraph 13 below. Plaintiffs certify that they have no financial interest in the Project.

(a) Weekly Average Effluent Limitations – With the exception of an effluent limitation for total recoverable zinc, for each failure to comply with a weekly average effluent limitation in the VPDES Permit, LCWA shall make a stipulated payment in the amount of $500.

(b) Monthly Average Effluent Limitations – With the exception of an effluent limitation for total recoverable zinc, for each failure to comply with a monthly average effluent limitation in the VPDES Permit, LCWA shall make a stipulated payment in the amount of $1,000.

(c) Minimum and Maximum Effluent Limitations – With the exception of an effluent limitation for total recoverable zinc, for each failure to comply with a minimum or

maximum effluent limitation in the VPDES Permit, LCWA shall make a stipulated payment in the amount of $500.

(d) All other VPDES Permit Requirements – For each failure to comply with any other requirement of the VPDES Permit, LCWA shall make a stipulated payment in the amount of $500.

(e) Discharge Relocation - For each day beyond four (4) years of the Date of Entry of this Consent Decree that LCWA fails to eliminate all VPDES-Permitted Wastewater Discharges from the Plant to Camp Creek, LCWA shall make a stipulated payment as follows:

Payment Per Violation Per Day	Period of Non-compliance
$100	1st through 14th Day
$250	15th through 30th Day
$500	31st Day and beyond.

(f) Information Sharing and Reporting Requirements. For each day that LCWA fails to timely submit a DMR or any other report required by the Information Sharing and Reporting (Section VII) provisions of this Consent Decree, LCWA shall make a stipulated payment as follows:

Payment Per Violation Per Day	Period of Non-compliance
$ 100	1st through 14th Day
$ 250	15th through 30th Day
$ 500	31st Day and beyond.

12. Subject to the Dispute Resolution (Section X) provisions, a stipulated payment obligation shall automatically begin to accrue on the first day that LCWA fails to meet any requirement of this Consent Decree and shall continue to accrue each day until LCWA achieves compliance with such requirement.

13. Stipulated payments shall be made within thirty (30) days of the date of receipt of a written demand from HGSI for payment for any non-compliance with any requirement in this Consent Decree unless LCWA invokes the Dispute Resolution (Section X) provisions or unless LCWA notifies HGSI that it has received notice that DEQ proposes to assess a civil charge for the same non-compliance for which HGSI has demanded a stipulated payment. In the event LCWA notifies HGSI that it has received notice that DEQ proposes to assess such a civil charge and LCWA has not invoked the Dispute Resolution provisions, LCWA shall make the stipulated payment demanded by HGSI within ninety (90) days of the date of receipt of a written demand from HGSI and deduct from such payment the amount of the civil charge assessed by DEQ for the same non-compliance for which HGSI has demanded a stipulated payment. LCWA shall not be entitled to offset against future stipulated payments civil charges assessed by DEQ in excess of stipulated payments due under this Consent Decree.

14. In the event that a stipulated payment is not made in accordance with the requirements of this Section, the stipulated payment shall be payable with interest from the original due date to the date of payment at the statutory judgment rate set forth in 28 U.S.C. § 1961(a).

15. If Plaintiffs seek relief for LCWA's alleged non-compliance with the requirements of this Consent Decree, they shall elect to seek either stipulated payments or civil contempt sanctions. Stipulated payments under this Section or motions for civil contempt shall be HGSI's sole and exclusive remedies for LCWA's' non-compliance with the requirements of this Consent Decree.

16. Stipulated payments shall be made by submitting a certified check payable to the "South Anna Monitoring Project" and tendering the check to the Project at the following address:

South Anna Monitoring Project
c/o Susan Barnabeo, Treasurer
2258 Nolting Road
Louisa, Virginia 23093

Any such check shall denote that it is a stipulated payment made pursuant to this Consent Decree and that use of the funds shall be earmarked for and restricted to monitoring and restoration of Camp Creek. Copies of the certified check and the transmittal letter shall be sent simultaneously to the following:

HGSI, P.O. Box 1065, Louisa, Virginia 23093 or by email to Rae Ely at Hawkwood01@aol.com or to such other email address as she may direct.

17. LCWA may require the Project to provide LCWA with an accounting of any stipulated payment expenditures prior to and as a condition of receiving stipulated payments from LCWA. Should the Project fail or refuse to provide such an accounting, LCWA shall make any required stipulated payments to an alternative non-profit organization to be agreed upon by the Parties.

IX. FORCE MAJEURE

18. "*Force Majeure*" for purposes of this Consent Decree is defined as an event arising from causes beyond the control of LCWA or, any entity employed by LCWA, including, but not limited to their consultants and contractors, which delays or prevents compliance with an obligation under this Consent Decree, despite their best efforts to fulfill the obligation. The requirement that LCWA exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential *Force Majeure* event (1) as it is occurring, and (2) following the potential *Force Majeure* event in an effort to minimize the delay or non-compliance to the greatest extent possible. *Force Majeure* does not include financial inability to perform an obligation required by this Consent Decree.

19. **Discharge Relocation to the South Anna River**: LCWA has requested DEQ to modify the VPDES Permit to authorize relocation of the Plant's discharge to the South Anna River. The Parties understand and agree that LCWA's commitment to eliminate all VPDES-Permitted Wastewater Discharges from the Plant to Camp Creek within four (4) years of the Date of Entry through relocation of the discharge to the South Anna River as provided in paragraph 6 of this Decree is based upon the assumptions that (1) DEQ and the SWCB will grant LCWA's request and modify the VPDES Permit to authorize the Plant's discharge to be relocated to the South Anna River, and (2) the modification will not be appealed by a Third Party or Third Parties.

(a) In the event DEQ and/or the SWCB deny LCWA's request to modify the VPDES Permit to authorize relocation of the Plant's discharge to the South Anna River, such denial shall be a *Force Majeure* event provided LCWA files a timely appeal of the denial and exhausts its judicial remedies. In such event, the four (4) year deadline in paragraph 6 of this Consent Decree shall be extended for each day beyond the date of such denial until the date the VPDES Permit is modified to authorize relocation of the Plant's discharge to the South Anna River.

(b) In the event modification of the VPDES Permit to authorize relocation of the Plant's discharge to the South Anna River is appealed by a Third Party or Third Parties, such appeal shall be a *Force Majeure* event and the four (4) year deadline in paragraph 6 of this Consent Decree shall be extended for each day beyond the date that a notice of appeal is filed until the appeal or appeals have been concluded, and following the appeals, the VPDES Permit authorizes relocation of the Plant's discharge to the South Anna River.

20. When circumstances are occurring or have occurred which may delay the completion of or non-compliance with any requirement of this Consent Decree, whether or not

due to a *Force Majeure* event, LCWA shall notify HGSI in writing within fifteen (15) days after it learns, or in the exercise of reasonable diligence under the circumstances should have learned, of the delay, anticipated delay, or non-compliance. The notice shall describe the basis for LCWA's belief that it has experienced or expects to experience a delay or non-compliance, whether it contends that the delay or non-compliance is due to a *Force Majeure* event, the nature of the *Force Majeure* event and/or the cause or causes of the delay or non-compliance, the anticipated length of the delay or non-compliance, the measures taken or to be taken to prevent or minimize the delay or non-compliance, and the timetable by which those measures will be implemented.

21. The Dispute Resolution (Section X) provisions shall govern resolution of any dispute regarding a delay in the performance or non-compliance with any requirement of this Consent Decree, and LCWA shall have the burden of proving that the delay or non-compliance is, or was caused by a *Force Majeure* event, and that LCWA exercised best efforts to prevent or minimize any non-compliance or delay in compliance caused by the event.

X. DISPUTE RESOLUTION

22. A Party may invoke the Dispute Resolution provisions of this Section by notifying all other parties in writing of the matter(s) in dispute and of the Party's intention to resolve the dispute under this Section. The Parties shall then attempt to resolve the dispute informally for a period of thirty (30) calendar days from the date of the notice. The period of informal negotiations may be extended beyond thirty (30) days by written agreement of the parties to the dispute.

23. If the Parties are unable to resolve the dispute through informal negotiation, any party to the dispute may invoke formal Dispute Resolution through mediation. The Parties will agree on a mediator. In the absence of agreement, and within fourteen (14) days of the request to mediate, the Parties will jointly request the U.S. District Court for the Western District of Virginia to select a mediator. The Parties agree to mediate all disputes in good faith. The mediation

process shall commence within two (2) weeks of the selection of a mediator and the Parties shall use their best efforts to conclude the mediation process within four (4) weeks of commencement. In the event mediation fails to resolve the dispute between the Parties, either Party may seek judicial resolution of the dispute in the U.S. District Court for the Western District of Virginia.

24. Any petition to the Court following mediation must be initiated by filing a motion with the Court asking the Court to resolve the dispute. The party filing the motion shall have the burden of proof. The motion shall describe the dispute, state that the party filing the motion has made a diligent, good faith effort to resolve the dispute through informal negotiation and formal Dispute Resolution, describe the result of the formal Dispute Resolution, and include a proposal for resolving the dispute. Within fifteen (15) days after receiving the motion, the other parties to the dispute shall file with the Court a response which may include an alternative proposal for resolving the dispute. The Court's ruling on the dispute shall be binding and final regarding the matter submitted for resolution.

25. The invocation of the Dispute Resolution procedures under this Section shall not extend, postpone or affect any obligation of LCWA under this Consent Decree unless expressly provided herein or unless the Parties agree to the extension, postponement, or effect. If applicable, stipulated payments with respect to the disputed matter shall continue to accrue, but payment shall be stayed pending resolution of the dispute. In the event LCWA does not prevail on the disputed issue, and the mediator finds that the dispute did not arise out of a good faith disagreement over an interpretation of LCWA's obligations under this Consent Decree, stipulated payments may be assessed, and if assessed, shall be paid as provided in Section VIII (Stipulated Payments). In the event that LCWA does not prevail, and then petition to the Court and subsequently lose its appeal, stipulated payments, if applicable, shall not be excused and shall be

deemed to have accrued from the date of the mediator's finding. However, in the event that LCWA prevails on the disputed issue, stipulated payments, if applicable, shall not be assessed for the disputed issue.

XI. DISPOSITION OF FUNDS DEDICATED TO SUPPLEMENTAL ENVIRONMENTAL PROJECT

26. In the event that all of the $172,368.00 committed to SEP in the Order is not used for the reuse project specified in the SEP or some other Reuse project, LCWA agrees to request that DEQ and the SWCB approve an alternative SEP designed to contribute to the restoration of Camp Creek as agreed upon by the Parties.

27. LCWA agrees to provide HGSI with a breakdown of the expenditures for the SEP and/or alternative SEP pursuant to the Order within thirty (30) days after such SEP is completed and approved by DEQ.

XII. NOTIFICATIONS

28. All notifications, submittals, reports, and other information required by this Consent Decree shall be directed to the individuals at the addresses specified below, unless those individuals or their successors give notice of a change to the other parties in writing.

As to HGSI:

HGSI, P.O. Box 1065,
Louisa, Virginia 23093
or by email to
Rae Ely at Hawkwood01@aol.com

As to LCWA

Dean C. Rodgers, or successor
General Manager
Louisa County Water Authority
P.O. Box 9
Louisa, Virginia 23093

With a copy to:

Dale G. Mullen, or successor
County Attorney
County of Louisa
One Woolfork Avenue
Louisa, Virginia 23093

XIII. EFFECT OF SETTLEMENT AND RELEASE

29. The Parties agree that this Consent Decree resolves HGSI's claims against LCWA for any violations of the CWA occurring up to and including the Date of Entry of this Consent Decree. Therefore, upon entry of this Consent Decree, the Plaintiffs, their directors, officers and employees release and covenant not to sue LCWA for any violations of the CWA occurring up to and including the Date of Entry of this Consent Decree.

30. The Parties also agree that this Consent Decree also resolves HGSI's claims against LCWA for any violations of the VPDES Permit's effluent limitations for total recoverable zinc occurring up to and including the date that this Consent Decree is terminated. Therefore, upon entry of this Consent Decree, the Plaintiffs, their directors, officers and employees release and covenant not to sue LCWA for any violations of the VPDES Permit's effluent limitations for total recoverable zinc occurring up to and including the date that this Consent Decree is terminated.

XIV. FEES AND COSTS

31. Except as expressly provided in this Section, HGSI and LCWA shall bear their own legal fees and costs with respect to the matters related to this Consent Decree. By the next business day following the Date of Entry of this Consent Decree LCWA shall pay to HGSI $345,000.00 in full satisfaction of HGSI's claims for legal fees and costs in this matter. Such payment shall be made by check made payable jointly to The Environmental Law Group, PLLC and The Historic Green Springs, Inc.

32. Each party agrees to pay the legal fees and costs reasonably incurred by the other party in enforcing this Consent Decree where the Court finds that this Decree has been violated or where the dispute is mediated and the mediator finds that one of the parties should pay the legal fees and costs incurred by the other party in such mediation.

XV. MODIFICATION

33. This Consent Decree contains the entire agreement of the Parties and shall not be modified by any prior oral or written agreement, representation or understanding. Prior drafts of this Consent Decree shall not be used in any action involving the interpretation or enforcement of this Consent Decree.

34. If all the Parties agree to modification of this Consent Decree in writing, they may apply to the Court for approval thereof. If the Parties do not reach agreement on the modification, a party may seek modification of this Consent Decree by motion pursuant to Rule 60(b) of the Federal Rules of Civil Procedure.

XVI. CONTINUING JURISDICTION OF THE COURT

35. The Court shall retain jurisdiction of this matter until termination of this Consent Decree to resolve disputes arising hereunder as may be necessary or appropriate for the construction, modification, execution or enforcement of this Consent Decree.

XVII. TERMINATION

36. LCWA may, with notice to HGSI, move to terminate this Consent Decree and all requirements and obligations hereunder provided that the motion contains the following certifications:

(a) LCWA has eliminated the all VPDES-Permitted Wastewater Discharges from the Plant to Camp Creek through the construction and operation of a pipeline to the South Anna River;

(b) LCWA has satisfied its remaining obligations under this Consent Decree; and

(c) There are no disputed outstanding stipulated payment claims hereunder.

XVIII. LODGING AND APPROVAL OF DECREE

37. Pursuant to 33 U.S.C. § 1365, this Consent Decree will be lodged with the Court and simultaneously presented to the U.S. Department of Justice for its review and comment for a period of up to forty-five (45) days. After the review period, this Consent Decree may be entered by the Court. If this Consent Decree is not entered by the Court, the Parties shall retain all rights they had in this litigation before lodging of this Consent Decree.

38. The Parties agree to cooperate in good faith in order to expeditiously obtain U.S. Department of Justice review of the lodged Consent Decree, and Court approval. In the event the Department of Justice proposes modifications to this Consent Decree, the Parties agree to confer and undertake good faith efforts to resolve any disputes that may arise out of the review by the Department of Justice.

XIX. SIGNATORIES

39. The undersigned representatives of the Parties certify that they are fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind such party to this document.

Entered this 5th day of November, 2012

United States District Judge

The Historic Green Springs, Inc.

By: Rae H. Ely, President

Date: 9/4/2012

Reginald Murphy

Date: 9/3/2012

Jane Stuart Murphy

Date: 9/3/2012

Louisa County Water Authority

By: , Chairman

Date: 9/7/12

Public Notice – Environmental Permit

PURPOSE OF NOTICE: To seek public comment on a draft permit from the Department of Environmental Quality that will allow the release of treated wastewater into water bodies in Louisa County, Virginia.

PUBLIC COMMENT PERIOD: November 16, 2012 to 5:00 p.m. on December 17, 2012

PERMIT NAME: Virginia Pollutant Discharge Elimination System Permits – Wastewater issued by DEQ, under the authority of the State Water Control Board

APPLICANT NAME, ADDRESS AND PERMIT NUMBER: Louisa County Water Authority, P.O. Box 9, Louisa, VA 23093—VA0090743

NAME AND ADDRESS OF FACILITY: Zion Crossroads WWTP, 323 Deer Run Lane, Gordonsville, VA 22942

PROJECT DESCRIPTION: Louisa County has applied for reissuance of the permit for the Public Zion Crossroads WWTP. The applicant proposes to release treated sewage wastewaters from residential, commercial, and industrial areas at a rate of 0.7 million gallons per day from the Zion Crossroads WWTP into two water bodies. Sludge from the treatment processes will be transferred to the Louisa Regional WWTP for further processing to a Class B sludge material that will be land applied. The facility proposes to release the treated sewage into an impoundment of Camp Creek and the South Anna River in the York River Watershed. A watershed is the land area drained by a river and its incoming streams. The Zion Crossroads permit will limit the following pollutants to amounts that protect water quality: pH, Carbonaceous Biochemical Oxygen Demand-5 day ($cBOD_5$), Total Suspended Solids (TSS), Total Kjeldahl Nitrogen (TKN), *E. coli* bacteria, Total Residual Chlorine, Dissolved Oxygen, Total Phosphorus, Total Nitrogen; Total Recoverable Copper, and Total Recoverable Zinc. Monitoring for Nitrate+Nitrite as Nitrogen and Hardness is required.

This facility is subject to the requirements of 9 VAC 25-820 and has registered for coverage under the General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Watershed in Virginia.

HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by e-mail, fax or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requestor, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. A public hearing may be held, including another comment period, if public response is significant, based on individual requests for a public hearing, and there are substantial, disputed issues relevant to the permit.

CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS AND ADDITIONAL INFORMATION: The public may review the documents at the DEQ-Northern Regional Office by appointment, or may request electronic copies of the draft permit and fact sheet.
Name: Anna T. Westernik
Address: DEQ-Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193
Phone: (703) 583-3837 E-mail: anna.westernik@deq.virginia.gov Fax: (703) 583-3821

Attachment 13

APPENDIX A
SCHEDULE OF COMPLIANCE

Louisa County Water Authority (LCWA) shall:

1. Evaluate and update the Louisa County Water Authority laboratory Standard Operating Procedures (SOPs) to include all current laboratory procedures, QA/QC, Standard Method Requirements, and a laboratory training program. The SOPs for the analysis of those parameters that are currently performed in-house, shall be submitted to DEQ by December 31, 2010, for review and approval. Once approved by DEQ, the SOPs shall be incorporated into the Louisa Regional and Zion Crossroads O&M Manuals. Prior to engaging in any future in-house laboratory analysis, SOPs shall be submitted to DEQ for review and approval.

2. Beginning November 1, 2010, keep a detailed log of all Plant maintenance including how often the Ultra Violet (UV) system is cleaned. This log shall be kept up to date and maintained on site for DEQ review.

3. Submit to DEQ for review and approval by January 31, 2011, a plan and schedule detailing the steps LCWA shall take to obtain an approvable pretreatment program. Said plan and schedule shall include all elements required by 9 VAC Part VII, and VPDES Permit VA0067954 Part I D.3, to develop an approvable pre-treatment program and shall include, but not be limited to the following requirements:

    A. Local limits, including a spreadsheet showing all calculations, and a comprehensive narrative explaining how the local limits were derived;
    B. A revised Sewer Use Ordinance and an Enforcement Response Plan;
    C. Inter-jurisdictional agreements for the pretreatment program for the Towns of Mineral and Louisa.

    Any comments provided to LCWA regarding the aforementioned submittal shall be addressed by LCWA to DEQ in writing within 30 days of receipt of comments. Once approved by DEQ, the aforementioned plan and schedule shall become an enforceable part of this Order.

4. Submit a plan and schedule to DEQ for review and approval by January 31, 2011, detailing the measures that LCWA will take to meet permitted zinc limits, including an evaluation of the current temporary chemical addition system. Once approved by DEQ, said plan and schedule shall be implemented by LCWA and shall become enforceable under this Order.

5. Submit completed Chain of Custody and Certificate of Analysis forms and any applicable bench sheets for compliance samples with each monthly DMR to DEQ for the life of this Order.

6. Documents to be submitted to the Department, other than the civil charge payment described In Section D of this Order, shall be sent to:

    Department of Environmental Quality
    Northern Regional Office

Attachment 14

Attn: Enforcement
13901 Crown Court
Woodbridge, VA 22193

APPENDIX B
SUPPLEMENTAL ENVIRONMENTAL PROJECT

In accordance with Va. Code § 10.1-11862, Louisa County Water Authority (LCWA) shall perform the Supplemental Environmental Project (SEP) identified below in the manner specified in this Appendix:

1. The SEP to be performed by LCWA is the design and construction of the facilities needed to provide effluent from the current design flows treated at the Zion Crossroads Wastewater Treatment Facility to the adjacent Spring Creek Golf Course and residential development (Development) for reuse by the Development as irrigation water.

2. LCWA has agreed to undertake an evaluation of alternatives for providing the treated effluent to the Development with the objective of identifying the most cost-effective engineering design for the SEP. LCWA will complete the evaluation and submit the result of its alternatives evaluation and a preliminary engineering report for the SEP to the Department by April 1, 2011. The cost of the alternatives evaluation and preliminary engineering report shall be paid for from funds other than the $40,608.00 allocated to the SEP in Paragraph D.2 of this Order.

3. LCWA shall complete the SEP no later than December 31, 2015. Beginning July 1, 2011, and every six months thereafter until the SEP is completed, LCWA shall submit written progress reports to the Department.

4. Within 30 days following completion of the SEP, LCWA shall submit a written final report on the SEP, verifying that the SEP has been completed in accordance with the terms of this Order, and certified by a responsible official of LCWA.

5. If the SEP has not or cannot be completed as described in the Order, LCWA shall notify DEQ in writing no later than 30 days after said determination. Such notification shall include:

   a. an alternate SEP proposal, or
   b. payment of the amount specified in Paragraph D.2 of this Order as described in Paragraph D.1 of this Order.

6. LCWA hereby consents to reasonable access by the Department to property or documents under LCWA's control for verifying progress or completion of the SEP.

7. LCWA shall submit to the Department written verification of the final overall and net project cost of the SEP in the form of a certified statement itemizing costs, invoices and proof of payment, or similar documentation within 30 days of the project completion date. For the purposes of this submittal, net project costs can be either the actual, final net project costs or the projected net project costs if such projected net project costs statement is accompanied by a CPA certification or certification from LCWA's Chief Financial Officer concerning the projected tax savings, grants or first-year operation cost reductions or other efficiencies.

APPENDIX A
SCHEDULE OF COMPLIANCE

LCWA shall:

1. Submit to DEQ, for review and approval by December 31, 2010, a plan of action and schedule to ensure consistent compliance with effluent limits and permit requirements. Upon its approval by DEQ, said plan and schedule shall become a part of and enforceable under the terms of this Order. Pending full implementation of said plan of action, LCWA shall operate the Plant in accordance with the approved Operations and Maintenance Manual, the Sewerage Collection and Treatment Regulations, and in accordance with generally accepted practices and procedures in the municipal wastewater industry.

2. By December 31, 2010, complete and certify repair or replacement of the UV intensity meters.

3. Submit monthly progress reports to DEQ outlining the projects and steps taken to achieve compliance as outlined in paragraph 1. Said monthly reports shall be due on the 10th of each month and submitted as an attachment with the monthly Discharge Monitoring Report.

4. Submit completed Chain of Custody, Certificate of Analysis, and bench sheets for all compliance samples with each monthly DMR to DEQ for the life of this Order.

5. Comply with the provisions of the Permit with respect to monitoring, recordkeeping, and reporting requirements with the exception of the increased monitoring and sampling frequencies as listed below:

Parameter	**Monitoring Requirements**	
	Frequency	*Sampling Type*
TSS	5D/W	24H-C
E. Coli	5D/W	Grab
TKN	5D/W	24H-C
Total Phosphorus	1/W	24H-C
$cBOD_5$	1/W	24H-C

6. Documents to be submitted to the Department, other than the civil charge payment described in Section D of this Order, shall be sent to:

   Department of Environmental Quality
   Northern Regional Office
   Attn: Enforcement
   13901 Crown Court
   Woodbridge, VA 22193

APPENDIX B
SUPPLEMENTAL ENVIRONMENTAL PROJECT

In accordance with Va. Code § 10.1-1186.2, LCWA shall perform the SEP identified below in the manner specified in this Appendix.

1. The SEP to be performed by LCWA is the design and construction of the facilities needed to provide effluent from current design flows treated at the Zion Crossroads Wastewater Treatment Facility to the adjacent Spring Creek Golf Course and residential development (Development) for reuse by the Development as irrigation water.

2. LCWA has agreed to undertake an evaluation of alternatives for providing the treated effluent to the Development with the objective of identifying the most cost-effective engineering design for the SEP. LCWA will complete the evaluation and submit the results of its alternatives evaluation and a preliminary engineering report for the SEP to the Department by April 1, 2011. The cost of the alternatives evaluation and preliminary engineering report shall be paid for from funds other than the $131,760 allocated to the SEP in Paragraph D.2 of this Order.

3. LCWA shall complete the SEP no later than December 31, 2015. Beginning July 1, 2011 and every six months thereafter until the SEP is completed, LCWA shall submit written progress reports to the Department.

4. Within 30 days following completion of the SEP, LCWA shall submit a written final report on the SEP, verifying that the SEP has been completed in accordance with the terms of this Order, and certified by a responsible official of LWCA.

5. If the SEP has not or cannot be completed as described in the Order, LCWA shall notify DEQ in writing no later than 30 days after said determination. Such notification shall include:
    a. An alternate SEP proposal, or
    b. Payment of the amount specified in Paragraph D.2.b.

6. LCWA hereby consents to reasonable access by DEQ or its staff to property or documents under LCWA's control, for verifying progress or completion of the SEP.

7. LCWA shall submit to the Department written verification of the final overall and net project cost of the SEP in the form of a certified statement itemizing costs, invoices and proof of payment, or similar documentation within 30 days of the project completion date. For the purposes of this submittal, net project costs can be either the actual, final net project costs or the projected net project costs if such projected net project costs statement is accompanied by the CPA certification or certification from LCWA's Chief Financial Officer concerning the projected tax savings, grants, or first-year operation cost reductions or other efficiencies.

Revised 2/2003

State "Transmittal Checklist" to Assist in Targeting
Municipal and Industrial Individual NPDES Draft Permits for Review

Part I. State Draft Permit Submission Checklist

In accordance with the MOA established between the Commonwealth of Virginia and the United States Environmental Protection Agency, Region III, the Commonwealth submits the following draft National Pollutant Discharge Elimination System (NPDES) permit for Agency review and concurrence.

Facility Name:	Zion Crossroads WWTP
NPDES Permit Number:	VA0090743
Permit Writer Name:	Anna Westernik
Date:	July 6, 2012

Major [ ] **Minor** [X] **Industrial** [ ] **Municipal** [X]

I.A. Draft Permit Package Submittal Includes:	**Yes**	**No**	**N/A**
1. Permit Application?	x		
2. Complete Draft Permit (for renewal or first time permit – entire permit, including boilerplate information)?	x		
3. Copy of Public Notice?	x		
4. Complete Fact Sheet?	x		
5. A Priority Pollutant Screening to determine parameters of concern?	x		
6. A Reasonable Potential analysis showing calculated WQBELs?	x		
7. Dissolved Oxygen calculations?	x		
8. Whole Effluent Toxicity Test summary and analysis?	x		
9. Permit Rating Sheet for new or modified industrial facilities?			x

I.B. Permit/Facility Characteristics	**Yes**	**No**	**N/A**
1. Is this a new, or currently unpermitted facility?		x	
2. Are all permissible outfalls (including combined sewer overflow points, non-process water and storm water) from the facility properly identified and authorized in the permit?	x		
3. Does the fact sheet or permit contain a description of the wastewater treatment process?	x		
4. Does the review of PCS/DMR data for at least the last 3 years indicate significant non-compliance with the existing permit?		x	
5. Has there been any change in streamflow characteristics since the last permit was developed?	x*		
6. Does the permit allow the discharge of new or increased loadings of any pollutants?	x **		
7. Does the fact sheet or permit provide a description of the receiving water body(s) to which the facility discharges, including information on low/critical flow conditions and designated/existing uses?	x		
8. Does the facility discharge to a 303(d) listed water?	x		
a. Has a TMDL been developed and approved by EPA for the impaired water?	x		
b. Does the record indicate that the TMDL development is on the State priority list and will most likely be developed within the life of the permit?	x		
c. Does the facility discharge a pollutant of concern identified in the TMDL or 303(d) listed water?	x		
9. Have any limits been removed, or are any limits less stringent, than those in the current permit?		x	
10. Does the permit authorize discharges of storm water?		x	
***Addition of discharge to the South Anna River.** ****TRC will be added to the South Anna River pipeline.**			

Attachment 15

I.B. Permit/Facility Characteristics – cont.	Yes	No	N/A
11. Has the facility substantially enlarged or altered its operation or substantially increased its flow or production?		x	
12. Are there any production-based, technology-based effluent limits in the permit?		x	
13. Do any water quality-based effluent limit calculations differ from the State's standard policies or procedures?		x	
14. Are any WQBELs based on an interpretation of narrative criteria?		x	
15. Does the permit incorporate any variances or other exceptions to the State's standards or regulations?		x	
16. Does the permit contain a compliance schedule for any limit or condition?	x		
17. Is there a potential impact to endangered/threatened species or their habitat by the facility's discharge(s)?	x		
18. Have impacts from the discharge(s) at downstream potable water supplies been evaluated?	x		
19. Is there any indication that there is significant public interest in the permit action proposed for this facility?	x		
20. Have previous permit, application, and fact sheet been examined?	x		

Part II. NPDES Draft Permit Checklist

Region III NPDES Permit Quality Checklist – for POTWs
(To be completed and included in the record only for POTWs)

II.A. Permit Cover Page/Administration	Yes	No	N/A
1. Does the fact sheet or permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)?	x		
2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)?	x		

II.B. Effluent Limits – General Elements	Yes	No	N/A
1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)?	x		
2. Does the fact sheet discuss whether "antibacksliding" provisions were met for any limits that are less stringent than those in the previous NPDES permit?			x

II.C. Technology-Based Effluent Limits (POTWs)	Yes	No	N/A
1. Does the permit contain numeric limits for ALL of the following: BOD (or alternative, e.g., CBOD, COD, TOC), TSS, and pH?	x		
2. Does the permit require at least 85% removal for BOD (or BOD alternative) and TSS (or 65% for equivalent to secondary) consistent with 40 CFR Part 133?	x		
a. If no, does the record indicate that application of WQBELs, or some other means, results in more stringent requirements than 85% removal or that an exception consistent with 40 CFR 133.103 has been approved?			
3. Are technology-based permit limits expressed in the appropriate units of measure (e.g., concentration, mass, SU)?	x		
4. Are permit limits for BOD and TSS expressed in terms of both long term (e.g., average monthly) and short term (e.g., average weekly) limits?	x		
5. Are any concentration limitations in the permit less stringent than the secondary treatment requirements (30 mg/l BOD5 and TSS for a 30-day average and 45 mg/l BOD5 and TSS for a 7-day average)?		x	
a. If yes, does the record provide a justification (e.g., waste stabilization pond, trickling filter, etc.) for the alternate limitations?			

II.D. Water Quality-Based Effluent Limits	Yes	No	N/A
1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality?	x		
2. Does the fact sheet indicate that any WQBELs were derived from a completed and EPA approved TMDL?		x	
3. Does the fact sheet provide effluent characteristics for each outfall?	x		
4. Does the fact sheet document that a "reasonable potential" evaluation was performed?	x		
a. If yes, does the fact sheet indicate that the "reasonable potential" evaluation was performed in accordance with the State's approved procedures?	x		
b. Does the fact sheet describe the basis for allowing or disallowing in-stream dilution or a mixing zone?	x		
c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have "reasonable potential"?	x		
d. Does the fact sheet indicate that the "reasonable potential" and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations)?		x	
e. Does the permit contain numeric effluent limits for all pollutants for which "reasonable potential" was determined?	x		

II.D. Water Quality-Based Effluent Limits – cont.	Yes	No	N/A
5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet?	x		
6. For all final WQBELs, are BOTH long-term AND short-term effluent limits established?	x		
7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)?	x		
8. Does the record indicate that an "antidegradation" review was performed in accordance with the State's approved antidegradation policy?	x		

II.E. Monitoring and Reporting Requirements	Yes	No	N/A
1. Does the permit require at least annual monitoring for all limited parameters and other monitoring as required by State and Federal regulations?	x		
a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver?			
2. Does the permit identify the physical location where monitoring is to be performed for each outfall?	x		
3. Does the permit require at least annual influent monitoring for BOD (or BOD alternative) and TSS to assess compliance with applicable percent removal requirements?		x	
4. Does the permit require testing for Whole Effluent Toxicity?	x		

II.F. Special Conditions	Yes	No	N/A
1. Does the permit include appropriate biosolids use/disposal requirements?	x		
2. Does the permit include appropriate storm water program requirements?			x
3. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements?	x		
4. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations?			x
5. Does the permit allow/authorize discharge of sanitary sewage from points other than the POTW outfall(s) or CSO outfalls [i.e., Sanitary Sewer Overflows (SSOs) or treatment plant bypasses]?		x	
6. Does the permit authorize discharges from Combined Sewer Overflows (CSOs)?		x	
a. Does the permit require implementation of the "Nine Minimum Controls"?			x
b. Does the permit require development and implementation of a "Long Term Control Plan"?			x
c. Does the permit require monitoring and reporting for CSO events?			x
7. Does the permit include appropriate Pretreatment Program requirements?		x	

II.G. Standard Conditions	Yes	No	N/A
1. Does the **permit** contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions?	x		

List of Standard Conditions – 40 CFR 122.41

Duty to comply	Property rights	Reporting Requirements
Duty to reapply	Duty to provide information	Planned change
Need to halt or reduce activity not a defense	Inspections and entry	Anticipated noncompliance
	Monitoring and records	Transfers
Duty to mitigate	Signatory requirement	Monitoring reports
Proper O & M	Bypass	Compliance schedules
Permit actions	Upset	24-Hour reporting
		Other non-compliance

2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for POTWs regarding notification of new introduction of pollutants and new industrial users [40 CFR 122.42(b)]?	x		

Part III. Signature Page

Based on a review of the data and other information submitted by the permit applicant, and the draft permit and other administrative records generated by the Department/Division and/or made available to the Department/Division, the information provided on this checklist is accurate and complete, to the best of my knowledge.

Name	Anna T. Westernik
Title	Environmental Specialist, Senior II
Signature	A. T. Westernik
Date	July 6, 2012